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USSR Report

ENERGY

No. 14

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ELECTRIC POWER

PROGRESS ON THERMAL ELECTRIC POWER STATIONS DISCUSSED

Kiev PRAVDA UKRAINY in Russian 12 Mar 80 p 4

[Article by N. Svichkolap]

[Text] We react differently to various phenomena in our lives. This depends greatly on the psychophysiological and personal qualities of a person.

For example, it has been established that the maintenance personnel of thermal electric power stations is responsible for 20-25% of troubles in the operation of the equipment. And this is in spite of the fact that 90% of the culprits are specialists with a high level of professional training.

According to Doctor of Medical Sciences Professor A. O. Navakatikyan, assistant director of the Kiev Scientific Research Institute of Labor Hygiene and Occupational Diseases, this institute, by request of the USSR Ministry of Power and Electrification, has been conducting studies for a number of years and developing methods and criteria for selecting workers of leading professions for power industry enterprises. Urgency of such studies is evident. Millions of people engaged in power engineering are subjected daily to great nervous and emotional stresses connected with their personal responsibility for normal operation of the equipment. Mistakes in their work may result in great economic losses. But how can you make demands of a man if, because of his psychophysiological qualities, is incapable of performing such jobs?

I have a test in front of me for determining the short-time memory function. There are six triangles with different kinds of shading. The subject is given 10 seconds to memorize them. This is one of the simplest tests which yield information on the ability of switching ones attention and concentration, the speed of the motor response, and technical and spatial thinking.

In order to reveal the responses of, let us say, a shift foreman of a boiler and turbine department or a senior machine operator of a unit in a stressed situation, a method of multiprofessional personal questionaire is used. It includes 600 statements pertaining to the health, opinions, self-evaluation, interest and other special human characteristics. This problem is done with the aid of electronic computers.

Our conversation was continued by the director of the laboratory of physiology and labor hygiene of women and teenagers, V. A. Buzunov. He said that the problem of the relations of personalities among operational brigades is extremely important. The selection of the brigade for the operation of power units with consideration for the requirements of psychophysiological compatibility determines in many respects the growth of labor productivity, economy in materials and means, as well as the health of the workers.

The work of the operating personnel also depends on the quality of training. For this purpose, an instruction and training center of the Ukrainian SSR Ministry of Power and Electrification was opened for the training of the operating personnel on the basis of the Tripol'skaya GRES. In cooperation with the institute, it conducts studies for the prediction of the reliability of the future operators.

Now let us talk about the improvement of the working conditions at thermal electric power stations. This problem is always given great attention. But, unfortunately, the levels of noise and air temperature are still above the permissible levels, and there is too much gas and dust contamination.

According to A. O. Navakatikyan, it is not accidental that hygienists and specialists in the areas of industrial microclimate, chemistry and physiology of labor took part in integrated work conducted at 18 thermal electric power stations situated in various climatic zones of our country.

Now, when the USSR Ministry of Power and Electrification is coordinating the sanitation rules for the designing, arrangement, and operation of thermal electric power stations, the experimental design office of the institute is developing concrete technical solutions for the improvement of labor conditions and, among other things, is designing high-capacity monitoring and control stations for operators.

In other words, cooperative work of medical personnel and engineers is continued and it is desirable to see its results to be used in practice.

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ELECTRIC POWER

BREEDER REACTOR TECHNOLOGY PROGRESSES

Moscow PRAVDA in Russian 25 Jan 80 p 3

[Article by O. Kazachkovskiy, Director, Physico-Energetics Institute, USSR State Committee for the Uses of Atomic Energy: "The Energy of Fast Neutrons"]

[Text] It has already been a little more than a decade since the collective of the Physico-Energetics Institute placed the world's first atomic power plant into operation at Obninsk. For us, these years have been filled with work on problems associated with further expansion of the possibilities of using atomic energy for the needs of the national economy and the good of the world. Thus we can understand the sense of responsibility elicited in us by the need, stated by CPSU Central Committee General Secretary Comrade L. I. Brezhnev at the November (1979) CPSU Central Committee Plenum, for reviewing the long-range plans for construction of atomic power plants possessing fast neutron reactors. After all, the institute must provide scientific leadership to projects associated with this problem as a whole.

What is the difference between these reactors and so-called thermal reactors, in which the kinetic energy of neutrons responsible for the fission chain reaction is artificially reduced by special moderators? Let me state it immediately. We know that only 1-2 percent of the nuclear fuel may be combusted in thermal reactors, since they mainly employ uranium-235. The theoretical hypothesis that full utilization of all extracted uranium in fast reactors and reproduction of fuel in the form of plutonium were possible, suggested in earlier times, was experimentally confirmed. Thus breeder reactors are significantly more effective than today's widespread thermal reactors. Hence it is clear that creation of breeder reactors has very important national economic significance. It is extremely significant that this problem has now emerged beyond the bounds of laboratory research, and that the center of gravity has moved here from scientific to engineering problems.

A BN-350 demonstration industrial reactor has been operating in our country in the young city of Shevchenko on the shore of the Caspian since 1973. It produces 125,000 kilowatts of electric power, and enough heat to obtain 80,000 cubic meters of desalinized water per day. Work is being done to place a BN-600 reactor into operation--the third block of the Beloyarskaya AES, the prototype of first-generation industrial breeder reactors. Its electric power capacity will be 600,000 kilowatts. Research is proceeding at about the same level abroad. Two demonstration industrial reactors similar to the BN-350 but having slightly lower output capacity were put into operation somewhat later and are now working in France and England. France is building a breeder reactor with an extremely large capacity--1.2 million kilowatts. It is planned to go into operation in 1983.

Another unique feature of breeder reactors is that fused sodium circulating in a special system is used to remove heat and transfer it to water. Given all of its seemingly exotic nature, it possesses the required nuclear physical and very good thermal physical properties. Moreover it does not require a high pressure in the reactor, and it does not create any sort of corrosion problems. The undesirable consequences that may be associated with sodium's high chemical reactivity with atmospheric oxygen and especially with water are averted by practically well-assimilated engineering resources (meticulous control over equipment quality, creation of protective housings in the necessary places, separation of the radioactive sodium and steam systems by an intermediate, nonradioactive system, organization of an early leak detection system).

The successes in operating sodium stands and drainage systems as well as experimental and demonstration reactors in the USSR and abroad show that the technology of this heat carrier has been assimilated. At the same time improvements have been made on breeder reactors cooled by high-pressure gas. Interest in such reactors is elicited by the desire to obtain a single-circuit system in which heat is transformed into electric energy in a gas turbine.

Plutonium formed during the operation of existing thermal reactors is best suited as the initial charge for breeder reactors. It was demonstrated that in this case nuclear fuel consisting of a mixture of plutonium and spent uranium would be the most advantageous. Simple calculations based on the program adopted for development of atomic energy would show that there would be enough plutonium from thermal reactors to support the introduction of breeder reactors at any practical possible scale in the next 15-20 years, if not longer. We should add to this that it would be economically simply unfeasible to accumulate the formed plutonium fuel at warehouses without using it, or to burn it in thermal reactors.

It is also understandable that we would need to process irradiated fuel extracted periodically from the fastest reactors. The fission products (slag) accumulating would have to be removed from it chemically, after which it would be returned once again to the irradiation cycle. This would be necessary if we are to achieve the basic advantage of breeder reactors--the possibility of utilizing nuclear fuel within them fully. The requirements on the rate of such fuel "recycling" will grow with time as well.

Concurrently with building first-generation reactors, we will have to continue work aimed at improving them and raising their effectiveness. There are a number of important problems here, for which the solutions are already visible today. I am referring first of all to raising the block's unit capacity. This is favored by the relatively small overall dimensions (in comparison with those of thermal reactors), and the absence of high pressure within the reactor itself. Special attention should be turned to improving the design of steam generators as well as their manufacturing and quality control procedures.

And so, we have not only satisfied the scientific-technical prerequisites, but we have also developed the industrial procedures for producing equipment for breeder reactors. The experience of manufacturing enterprises such as the Plant imeni Ordzhonikidze in Podol'sk is invaluable in this regard. Significant, important experience has been accumulated by construction and installation organizations. In a word, entire collectives of skilled specialists able to solve all problems associated with building and operating breeder reactors have already evolved. We only need add that these collectives are now developing new high-capacity breeder reactors with electric outputs of 800,000 and 1.6 million kilowatts. Thus we are creating the necessary foundation for broad introduction of breeder reactors into the country's power engineering system, and for successful completion of the assignments posed by the November Plenum of the CPSU Central Committee.

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ELECTRIC POWER

BALL LIGHTNING'S POTENTIAL USES STUDIED

Moscow TRUD in Russian 28 Mar 80 p 2

[Article by Correspondent I. Mosin: "The Mysteries of Ball Lightning"]

[Text] The archives of Doctor of Chemical Sciences M. Dmitriyev, laboratory director at the Institute of General and Communal Hygiene, contains hundreds of interesting accounts by witnesses of encounters with ball lightning.

"During an intense thunderstorm," reads an account from Stavropol'skiy Kray, "a fireball the size of a soccer ball bounced along the street. Every time it touched the ground it blasted a hole 1 meter deep and a meter and a half in diameter. In this fashion the ball 'pock-marked' the street for a length of 2 blocks, after which it blew up with a noise and disappeared into the ground as a fiery arrow."

A somewhat unusual incident occurred in Khabarovsk: "Ball lightning struck a boiler containing almost 7,000 liters of water. The water went to an immediate boil. The lightning 'bathed' in the boiler for about 10 minutes before dying out."

Experts later estimated that the energy released by the ball lightning in such a case is equivalent to detonation of 2 tons of TNT.

The origin of ball lightning is still being debated in the scientific world today. According to one hypothesis it is antimatter penetrating to us from outer space. According to another it is the result of the focusing of cosmic rays by the clouds. And Academician P. Kapitsa suggests that it is a special area of the atmosphere concentrating radiowave emissions from thunder clouds.

M. Dmitriyev's laboratory has been studying the nature of ball lightning for about 30 years.

"According to today's beliefs," said Mikhail Timofeyevich, "ball lightning arises in the atmosphere in response to the action of cosmic rays, solar radiation, dielectric fields of clouds, and ordinary lightning upon the air.

Unstable, chemically reactive particles form as a result. Under particular conditions they begin to react with each other, going into an excited state. The formed substance begins to heat up. As a result a condensed ball of energy with a diameter from 10-20 centimeters forms, reddish or blindingly white in color. Each day about 600 ball lightning observations are recorded in our country. When the conditions are right we can concurrently observe hundreds and even thousands of lightning balls."

The laboratory has already learned how to model the processes occurring during formation of this mysterious lightning. It is interesting that scientists have proposed a number of useful things on the basis of these processes. As an example they have built instruments making it possible to establish the degree of contamination of atmospheric air diluting gaseous wastes from industry. These are the first practical steps.

"Strange as it may seem," M. Dmitriyev continued, "ball lightning offers rather extensive prospects for application. We are now working on dependable technical resources that protect airplanes, petroleum and gas storage dumps, and tankers from lightning. Specialists are highly interested in the energy reserve locked within lightning. It is dozens of thousands of times greater than that of gasoline. This is essentially a supercaloric fuel. The problem now is to learn how to isolate it."

Artificial lightning balls can be used as reactors to obtain nitrogen fertilizers from air and water. Materials may be subjected to high quality welding and processing in such reactors. Moreover ball lightning is a powerful source of light. In the future it may be used to illuminate cities, especially at times of polar night. The explosive force of ball lightning may be harnessed to move rock, and to build tunnels and dams. In a word, in a little while lightning will become a dependable hand in plant shops, in scientific laboratories, and on the fields.

11004
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ELECTRIC POWER

FIFTY-YEAR REVIEW OF KHAR'KOVENERGO SYSTEM

Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 1, Jan-Mar 80 pp 8-12

[Article by M. M. Prosvetov, general director of PEO "Khar'kovenergo"]

[Text] The Kharkov energy system "Khar'kovenergo" began its industrial activities with the Kharkov Association of State Electric Power Plants formed in December, 1929—KHOGES—transformed in November, 1933 into the Regional Energy Administration. The association received the electric power plant being completed in the Kharkov region—ESKHAR (GRES-2) and the Central Urban Electric Power Plant—KHTSES with all the power transmission lines of these power plants.

The established administration of the nascent energy system successfully started up energy facilities, built up operation of energy enterprises and further evolution of the region's energy base, which assured normal power supply to the turbulently developing industry of Kharkov.

In the years of the first five-year plans, the tractor plant TETS (now TETS-4) and Karsnozavodskaya TETS (now TETS-3) were built and put into operation; in addition to electrical energy, they produced steam and heat for nearby plants; district heating received underwent further development and for many years they were the chief sources of centralized heat supply for Kharkov.

By the start of World War II, electric power plants of the system had a total capacity of 169,500 kW; 13 substations operated in the power grids at 110 and 35 kV with an overall transformer capacity of 198,000 kW and line run of 223 kilometers. Urban electric power grids had 21 distribution and 580 transformer centers, 580 kilometers of cable and 514 kilometers of above-ground lines in operation. In addition to the city, electrical energy was supplied to several regions of the oblast.

Kharkov engineers labored with great macho on duty during the war years guaranteeing power supply to the region at the start of the war, disassembly and evacuation of equipment to the depths of the country and rebirth of war-torn electric power plants, electrical and thermal networks.

Not one plant could provide electrical energy to liberated Kharkov, plundered and destroyed by the Nazis, from the established capacity of the prewar period. The country still bore the heavy burden of the war, and thus engineers had to tackle extremely complex jobs, use surviving resources of the city to restore its power supply as quickly as possible.

Restoration of power plants and grids was headed up by the regional energy adminsitration "Khar'kovenergo" whose manager was D. A. Shusharin, chief engineer V. I. Ivahshenko and deputy restoration administrator was V. A. Kokarev.

The first immediate requirements for power supply were provided by a 1,000 kW energy train delivered to liberated Kharkov and operating within a few days. In little more than two months, by the 26th Anniversary of the October Revolution, industrial current extracted from the ruins of the urban power plant was transmitted by the repaired turbine generator of 7,000 kW established at a temporary power plant.

This was indeed a great holiday for Kharkhovites—the city had water, the baths were operating, the trolley was running. But that was only the start. For normal electric power supply to the city and restoration of its plants, it was necessary to regenerate and resuscitate the chief power plants of the system from the ashes and ruins.

As a result of the selfless labor of teams of energy enterprises, energy builders and assmebers even in the first six months of 1944, the first plants were set into operation at all power plants in the system; by 1950 restoration of all power plants, electrical and thermal grids was completed and the prewar level of production of electrical and thermal energy was achieved.

The significant yearly growth in energy demand in the 1950's required great expansion of operating electric power plants and construction of a new GRES.

During these years the electrical capacity of the TESTS-3 was doubled, electrical and thermal capacity of TETS-4 was increased, and the capacity of GRES-2 was increased more than five-fold.

Introduction of new capacities was accompanied by reconstruction of electric power plants aimed at improvement of operation of equipment, thermal and electrical circuits, economy of fuel and electricity, as well as broad introduction of mechanization of labor-intensive work and automation of technological processes; as a result of this, each year the operating reliability of power plants increased and electric networks increased, specific consumption of fuel was reduced, labor productivity increased and energy costs dropped.

In 1957 the energy system received the 10 electric power plants of the industrial cities of the Poltava and Sumsk oblasts with a total established capacity of about 56 MW, including the steam-turbine power plants: Poltavskaya—11.5 MW, Kremenchugskaya—15 MW, the TETS under construction in Sumy and Akhtyrka of planned capacity of 24 and 12 MW, respectively.

in these cities, the acute shortage of generating capacities could be sensed, and this slowed down the development of industry and urban management. To improve their power supply, construction and operation of the Sumsk and Sumskaya and Akhtyrskaya TETS were accelerated, an energy train and diesel generator of unit capacity 1000 kW were established in Poltava, Lubna, Konotop, Mirgorod, Kupyansk, Krasnograd, Romna and construction of high voltage lines was unfolded from the started Zmiyevskaya GRES with erection of support substations and further connection of these regions to the electric grids of the power system.

During the 7th and 8th Five-Year Plans, the development of the Kharkov energy system was characterized by the rapid increase of energy capacities because of construction of the Zmiyevskaya GRES, Kremenchugskaya TETS and the rapid development of electrical network management.

Thus in these years was constructed and put into operation the Zmiyevskaya GRES of total capcity of 2400 MW (6 power plants of 200 and 4 power plants of 300 MW each), the Kremenchugskaya TETS—150 MW. Thermal capacities at the TETS-3 and TETS-4 were increased by installing water-heating boilers PTV-100 and PTVM-180, three regional boiler plants equiped with PTVM-50 and PTVM-100 boilers were erected in new areas of residential housing of Kharkov city.

A distributed network of power transmission lines with support substations of 330 KW was constructed in Kharkov, Poltava, Sumy, Konotop. Intersystem high voltage transmission lines were erected for connection with Donbass, Dneprov, Kiev, Belgorod, Kursk, Voronezh and Bryansk power systems.

Considerable growth in the generating capacities and network management of the energy system made it possible to eliminate a large number (over 1,000) small uneconomical power plants with obsolete equipment in Kremenchug and Poltava, to connect all users of Kharkov, Potlava and Sumsk oblasts to state electrical grids and complete the solid electrification of agriculture in the Kharkov oblast in 1967, Poltava and Sumsk oblasts in 1970.

Centralized heating was expanded in Kharkov, Sumy, Kremenchug and Akhtyrka.

As a result of successful assimilation of the operation of highly economic equipment of the Zmiyevskaya GRES and Kremenchug TETS, introduction of new equipment, advanced technology and realization of other progressive solutions in the decade, the output of electrical energy and production of heat was over six times greater than in 1960 and specific consumption of fuelwas reduced by 128.4 g/kWh, which made possible a savings of more than 4,000,000 tons of conventional fuel in the decade.

In the last decade, the activities of enterprise teams and industrial administration services of the energy system were aimed at seeking and utilizing production resrouces, efficient utilization and economy of raw materials, materials and labor resources, enhancing economic efficiency of energy production.

During this period further development of electrical grids and centralized heating of cities continued, improvement of work of energy plant equipment of the Zmiyevskaya GRES, assimilation of newly introduced equipment at other electric power plants and electrical grid enterprises was carried out, including centralized heating turbine of 100 MW, introduced in 1972 at the Kremenchugskaya TETS.

Much work was done on completing circuits of power supply of individual energy regions and large users with wide introduction of various kinds of electrical automation, which raised to the highest degree of reliability the power supply of users.

Simultaneously, much scientific research work was done to create and introduce automated energy control and enterprises based on the use of II and III generation computers and their software.

Large reconstruction works were done at energy plants of 300 MW of the Zmiyevskaya GRES with replacement of individual subassemblies and improvement of circuits aimed at enhancing their operating efficiency and economy. Reconstruction was done on the 50 MW turbine of GRES-2 into centralized heating, reconstruction of high pressure boilers of TETS-3 with enhancement of their economy and productivity, the turbines of TETS-3, TETS-4, Sumsk and Akhtyrskaya TETS were converted to purely centralized heating conditions during the heating season, which increased their thermal capacity and eliminated fuel loss with coolant. Several other effective measures were taken.

This made it possible in the 9th Five-Year Plan to increase output of the electrical energy by 32 percent and heat output by 50 percent as compared to the 8th Five-Year Plan, and to save about 800,000 tons of conventional fuel and over 350,000,000 kWh of electricity.

A great contribution to the enhancement of operating efficiency was made by efficiency experts and inventers. In the 9th Five-Year Plan alone, over 9,500 efficiency expert proposals and inventions were introduced with an economic effect of 9,600,000 rubles. From various sources of technical information at enterprises of the system, 690 innovations were introduced with a total economic effect of over 3,000,000 rubles. Labor productivity rose 20.4 percent. In 1973, the energy system received oblast enterprises of rural electrical grids of Kharkov, Poltava and Sumsk oblasts.

Therefore, the associaton of all energy of these oblasts was completed into a unified energy system with unified management and technical administration.

The growth of energy demand of the region in the last decade by more than double has made it necessary to construct new support substations and expand old ones and their feeder transmission lines, as well as intensify intersystem connections.

Therefore, in these years the new support substations of 330 kW put into operation in Pervomaysk, Kremenchug, Kupyansk and Kharkov, transformer capacity was increased at all previously introduced substations. The grid of regional substations and substations of the deep country were greatly expanded; the distributing grids in cities, and particularly in the rural locality were evolved significantly.

For further evolution of centralized heating, thermal capacities in Kharkov, Sumy and Kremenchug were enlarged. Construction was begun on a new large TETS in Kharkov, the first energy plant with centralized heating turbine of 120 MW was introduced in 1979. Thermal networks were developed.

In the 10th Five-Year Plan, the team of the energy association, struggling to bring to life the resolutions of the 25th Congress of the CPSU, did much work on improving operation of energy enterprises, aimed at saving energy resources and enhancing economic efficiency of work, as well as improvement of enterprise management. Questions of fuel economy and electrical energy are issues of primary importance in the work of teams of electric power plants and electrical networks.

To fulfill these jobs, efforts of party, union and komsomol organizations of enterprises are aimed. They are widely reflected in the annual work plants, in plans of organizational and technical measures, team measures, team agreements, socialist obligations and other documents under daily monitoring of social organizations of the teams. For this purpose, creative initiative, efficiency expert and inventor ideas of energy and technical associations and advanced workers are widely used.

Much work has been and is being done to monitor the efficient consumption of energy resources in the national economy.

The movement for a communist attitude toward labor and wide support of new initiatives, socialist competition of advanced teams of the country have taken on a wider scale.

In the movement for communist labor, all enterprises of the association are participating. Over 15,000 workers are competing for the title "Shock worker of communist labor", of which about 10,000 men have recieved this title. Three hundred seventy three brigades, 179 sectors and 50 shops have won the title "Team of communist attitude toward labor".

The teams of the KremenechugTETS and Poltava southern electrical networks won the honorary title "Enterprise of communist labor".

The initiative of workers of the Rostov oblast "Work without laggards" was supported by 22 enterprises, 160 shops, 410 sections and shifts, 834 brigades, 8068 workers; The Zaporozhets oblast—"Manual labor against the shoulders of machines"—by 18 enterprises, 104 shops, 255 sectors and shifts, 398 brigades and 4075 workers; 18 enterprises, 194 shops, 394 sections and shifts, 688 brigades and 9040 workers supported the initiative of the Plant imeni Shevchenko "From my personal contribution to enhance efficiency of production, labor and recreation culture, strengthen social order is begun by the section, shop, enterprise, rayon, city of high efficiency production, high culture and model social order."

With the development of the energy system, the structure of enterprise and energy system management changed and improved, aimed at lowering the cost of the administration and enhancing its operability.

Small structural subdivisions and enterprises were eliminated and on their basis were created specialized enterprises on heat supply of cities and electrical supply for individual regions, centralized repair of electric power plants and automated transport, energy supply and supervision, centralized bookkeeping.

Scheduling was developed with the introduction of modern dispatcher management technology, remote control and automated devices. Based on introduction of computers, ASUTP were created for energy plants, ASUP of the Zmiyevskaya GRES and ASU of the energy system with centralization of several management functions.

In 1975, The Regional Energy Adminsitration was converted to the industrial energy associaton "Khar'kovenergo". Major administrative functions such as current and future planning, technical evolution and scientific research, financial accounts and financing of capital construction, material and technical supply and energy supply were centralized. In the energy association were established unified economic indicators, more objectively reflecting enterprise activities.

In the energy association there are 25 specialized enterpises including: 8 GRES and TETS, 11 enterprises of electrical networks, specialzed enterprises of energy repair, automated transport, energy supply, etc.

The electrical power plants of the energy association have a capacity of 3140 MW and provide an annual output of about 20,000,000,000 kWh of electricity and over 11,000,000 Gcal of heat.

The Kharkov energy system has become one of the major links in the combined energy system of the South and junction of connection of associated energy systems of the South and Center and is an energy base of the region of the Northeastern portion of the Ukraine (Kharkov, Poltava and Sumsk oblasts) with highly developed industrial and agricultural production.

A center of the energy system is Kharkov—one of the major industrial, scientific and tehcnical and cultural centers of the country.

The multi-thousand collective of the enrgy asosciation, having taken in increased socialist obligations, carrried them out by the day of their 50th anniversary.

Thus the plan of electricity production and heat output in the first six months was fulfilled 100.3 percent, 1800 tons of conventional fuel and 8,500,000 kWh of electricity were saved.

Over 400 workers of the energy association were awarded orders and medals of the Soviet Union for their selfless labor, including the highest award of the

Homeland, the Order of Lenin: machinists of energy plants of the Zmiyevskaya GRES G. I. Voloshin, N. I. Kovalev M. M. Petrov, turbine machinists of GRES-2 N. A. Arkhipov, Kremenchugskaya TETS S. P. Zhikharev, turbine repair fitter G. T. Seryy, electrical assembler of GRES-2 M. D. D'yachenko and others, and machinists of the energy plant of the Zmiyevskaya GRES A. S. Zhuravel' was awarded the title Hero of Socialist Labor.

The energy system continues to develop by tackling complex jobs much wider in scale and technical complexity, but in addition to this, conditions have changed and the resources for their successful solution have greatly expanded.

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ELECTRIC POWER

PROGRESS ON KHAR'KOVENERGO POWER STATIONS

Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 1, Jan-Mar 80 pp 14-15

[Article by P. D. Denbnovetskiy, engineer]

[Text] The Kharkov division of the "Teploelektroproyekt" trust since 1932 has been the general planner of primary facilities of the system in both electric power plants, substations and power transmission lines (until 1963) as well as thermal grids of the city of Kharkov and other cities entering into the "Khar'kovenergo" system.

In the prewar years were planned the Kharkovskaya TETS-3, expansion of the Kharkovskaya TES-1, GES-2, TETS-4, No. 5 , No. 7 and No. 8 substations, additional power transmission lines to link these power plants and deliver power from them.

During World War II, the division evacuated the primary technical documentation on electric power plants of the Kharkov system, which greatly aided them in recovery work after the German occupiers were driven out.

After September, 1943 division workers carried out planned work on urgent restoration of the destroyed energy facilities of the city and the Kharkov energy system, for which three planning brigades were organized. The first restored work by the power plant in Kharkov was the KHEMZ power plant where a 7000 kW turbine generator was installed and four boiler plants disassembled from the Kharkov GES-1. All planned work for construction and startup of the turbine generator was done within two months. At the Kharkov TETS-4 in 1943 planning and restoration work on the 8 MW turbine generator and five boilers was completed, also disassembled from the Kharkov GES-1 and the turbine generator AT-25-1 from the "Metro-Vickers" generator.
In addition, the Kharkov GES-2, TETS-3, three boilers at the GES-1 and a boiler installation wer partially restored.

Planning and restoration work continued on two returned 22 MW turbine generators at GES-2, 25 MW turbine generator at TETS-3 and 35/6 kV substation and nine 110 kV power transmission lines extending 160 kilometers and six 35 kV lines extending 79 kilometers.

The general scheme of electrification of Kharkov oblast was completed in 1946-1950, and planning research work was done to expand the Kharkov GRES-2 to 100,000 kW and the TETS-3. A working plan was developed to install the 55,000 kW turbine generator of station number 4 at TETS-4; a site and working plan was selected for the Losevskaya substation 110/35/6 kV, working plan of 110 kV power transmission lines of GES-2, the substation "Losevo" (30 kilometers) and the 35 kV LEP from substation 10 to substation 17 (25 kilometers).

In the future planning studies were continued work to expand and reconstruct Kharkov GES-2, TETS-3, TETS-4. Plans were made to connect and monitor these power plants, plans for relay protection of power transmission lines, remote control and control systems of the "Khar'kovenergo" system. Research and test projects were done for selection of a site for the largest substation in the "Khar'kovenergo" system, Number 20, at 220/110/35 kV which was then switched to 330 kV; substation 110/35 "Novo-Bavarskaya"; and "Ivanovskaya"; six 35/6 kV substations and selection of the 220 kV VL route "Slavyansk-Zmiyev-Kharkov"; six 110 kV VL totalling 80 kilometers in length and six 35 kV VL 65 kilometers long.

Work continued to select sites for the Zmiyevskaya GRES 200 MW capacity north of Lake Liman in the Zmiyevskiy rayon on which were made the necessary research studies.

For the Kharkov TETS-3 the division put out a planned assignment and working sketches of installation of two gas turbines (2 x 50). Sites were selected, research was done and technical plans and working sketches of the 330 kV substation were made: Poltava, Sumy, Konotop. Research studies were made and working sketches were issued on 330 kV power transmission lines: "Kremenchug-Poltava-Zmiyevskaya GRES"; "Zmiyevskaya GRES-Kharkov-Belgorod", "Zmiyevskaya GRES-Sumy", and expansion of the "Loevskaya" substation from 220 kV to 330 kV. Planning assignments were made for the 110 kV power transmission line from "Konotop-to-Lubno", "Konotop-Korlevets-Shostka", "Sumy-Lebedin", "Bogodukhov-Akhtyrka", power supply plans for the Borovskiy rayon (10 kV line) and planned assignments of heating boilers (in Gcal/hr): "Pavlovo Pole"—300; "Saltovskaya"—600; Serp i Molot"—400; "Kholodnaya Gora"—200. From these boilers plants were developed several heat mainlines for providing heat to residential neighborhoods in the city, with a total length of 28 kilometers.

In 1968, technical and economic justification was issued for construction of Kharkov TETS-5 at 1200 MW capacity burning organic fuel.

The division also developed a plan for installation for dumping dry ash for the Zmiyevskaya GRES, the heat route from the Kremenchug TETS to an automobile plant (13 kilometers), a scheme for heat supply of Chuguyevo, planning concepts for comprehensive automation, remote control and control systems of thermal grids of Kharkov.

Elaboration is going on now for a heat supply scheme for Kharkov for the coming period with analysis of heat supply source; planning work on reconstruction of Kharkov's TETS-3, TETS-4 and GES-2 is being done for construction of heat mainlines from the Kharkov TETS-5 under construction with a total length of 30 kilometers.

During the entire period of collaboration with "Khar'kovenergo", the division of the "Teploelektroproyekt" institute has encountered an attentive, creative attitude towards the on-going work and the problems posed on the part of both system management and its enterprises, the persistence in the realization of the technical decisions made.

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LADYZHINSKAYA GRES, GAS PREPARATION COMPLEX DESCRIBED

Moscow PROMYSHLENNOYE STROITEL'STVO in Russian No 3, Mar 80 pp 2-3

[Article by V. I. Grech, engineer (USSR Gosstroy)]

[Text] It is difficult to overestimate the significance of the resolutions of the November (1979) Plenum of the CPSU Central Committee and of the speeches delivered there by the Secretary-General of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet Comrade L. I. Brezhnev in successful completion of the goals of the Tenth Five-Year Plan and preparations for the fulfillment of the plans of the Eleventh Five-Year Plan.

As is known, Comrade L. I. Brezhnev gave much attention in his report to the problem of capital construction on which more than one fifth of the national income is spent and on whose timely materialization depends our economy, the rate of the scientific and technological progress in the country, and effectiveness of production.

In this connection, advanced methods of construction of two projects deserve attention: Ladyzhinskaya GRES in the Ukraine and plants for complex preparation of gas (UKPG) at the "Medvezh'ye" field in Tyumen' which made it possible to put them into operation with a good quality of work much ahead of schedule.

The designing and experimental construction of the Ladyzhinskaya GRES of 1800 MW (6x300 MW) were done by the Kiev branch of the Teploelektroproyekt [All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Structures] and Yuzhenergostroy [Trust for the Construction of Power Facilities in the Southern Regions] by a fundamentally new high-speed flow-line method within a group of large electric power stations of the Ukraine.

This method is based on the concentration of funds and resources on projects and types of jobs affecting the critical parts of the network schedule, acceleration of construction jobs for the entire main building and subsequent installation of the main technological equipment and pipelines (without the usual combining of construction and installation jobs), and improvement of the specialization and organization of specialized flow lines of construction and installation brigades.

The realization of these principles made it possible to obtain a definite economic effect during the construction of the Ladyzhinskaya GRES.

The accelerated construction of the GRES made it necessary to concentrate the efforts of the design organization: an independent department for integrated designing of Ladyzhinskaya GRES with a staff of 130 people was created in the Kiev branch of Teploelektroproyekt; a group of field designing consisting of 50 people was constantly present at the GRES construction site. More than 20 subcontracting (scientific-research, experimental, and other) specialized organizations were involved in the designing. Such concentration of efforts and the designing of the GRES with consideration for flow line construction of power units of the same type and capacity made it possible to issue the design specifications strictly in accordance with the technology of the organization of construction at the times determined by network schedules; to develop the entire working technical specifications for the electric power station in 33 months, twice as fast as for a similar GRES with the designing practice existing at that time; to reduce sharply the volume of technical specifications due to the use of standard designs and a greater rate of repetition in the designs and decisions in flow line construction of single-type power units (two-thirds as many drawings were issued as for analogous electric power stations).

During the stage of the development of a detailed plan of high-speed flow line construction of the GRES, electronic computers were used to determine the exact dates and pace of the introduction of units, movement of brigades within the station, arrangement of the construction facilities, the problems of improvement of the material and technical supply and management of construction, as well as to calculate the specific labor intensiveness of construction per one kilowatt of the installed capacity of the station.

Much attention was given to the engineering preparation of the construction project. The supply of the construction site with all materials was organized according to plans for delivering complete sets, and the orders for the delivery of structures were placed for the entire volume of construction and installation jobs. This made it possible, even before the beginning of the main jobs at the construction site, to coordinate the month-by-month schedule for the shipments of structures coordinated with the installation schedule.

The divided method of the construction of the main building made it possible for the builders and installation organizations to improve their specialization, to organizize linear flow lines, and to ensure their continuity within the limits of the entire building.

Eighteen specialized flow lines were organized for the assembly of the main building. Each flow line was equipped primarily with mobile crawler cranes and had access roads and transportation facilities. Structures were delivered to the assembly area by motor vehicles, because waiting for the completion of an access railroad would lengthen the construction periods. For this purpose, the platforms of the trailers were reequipped for long large-size structures, which made it possible to assemble directly from the vehicles in all flow lines simultaneously and achieve a high pace in erecting the main building.

The fulfillment of construction jobs in the underground part of the main building to the full design capacity before the beginning of the assembly of the heat and power equipment made it possible to use bridge cranes for assembling the foundations for the equipment and the construction of the underground facilities for the boiler and machine departments; this made it possible to complete the construction of the underground facilities twice as fast and to reduce manual work on such jobs as partial filling under the floors of basements, filling the foundations, and construction of concrete floors.

The following flow lines were organized when heat and power equipment was being assembled in the main building: in the engine room, in the boiler department with a hopper-deaerator section, and in the rear part of the boiler room.

The assembly of boiler units and pipelines at large-unit assembly areas was separated into an independent flow line.

The flow line fulfillment of construction and assembly jobs according to sliding schedule with a three-shift operation made it possible to ensure a high degree of the utilization of construction machines and devices. The return on investment at the construction of Ladyzhinskaya GRES was seven rubles twelve kopecks (against an average index in power construction of 3-4 rubles), and the utilization of tower cranes was 115.4% in comparison with the directive norms and that of boom cranes was 105.2%, which is higher than the average overall indexes for the USSR Ministry of Power and Electrification.

The power-worker ratio was 9 kW/man against an average ratio of 7 kW/man in the power construction industry, and the actual machine-worker ratio was 1300 rubles/man against an average of 2000 rubles/man in the system of the USSR Ministry of Power and Electrification. Thus, there were no more mechanical devices at the construction of the Ladyzhinskaya GRES than at similar construction sites.

A progressive form of settling accounts for fully completed projects and stages of work was introduced at the construction project. The specialization level constituted 75.2% as compared to a 66% overall level achieved within the USSR Ministry of Power and Electrification.

The labor input per 1 kW of installed capacity as of 1 January 1972 (by the time of the introduction of the full design capacity of the Ladyzhinskaya GRES) was 2.4 man-day/kW, i.e., was reduced almost to one half in comparison with the average proportionate labor input in the construction of electric power stations for that period.

As a result of the concentration of funds and resources during the high-speed flow-line construction of the Ladyzhinskaya GRES, it was possible to achieve the fulfillment of the largest annual volume of construction and installation jobs in 1970 in the amount of 47.4 million rubles, which is 34% higher than the maximum annual volume of construction and installation jobs when capital investments are distributed in accordance with the SNiP [Construction Norms and Regulations] norms.

For the first time in the practice of power engineering construction, five power units of 300 MW were put into operation in the course of 1971 alone at the Ladyzhinskaya GRES. The total construction of the main building took 42 months (from the beginning of the excavation to the introduction of the last sixth power unit) instead of 52 months according to the norms, and the station was completed two years earlier than the normative deadline.

The state receiving commission accepted the Ladyzhinskaya GRES for permanent industrial operation with an evaluation of "excellent".

The total economic effect from the accelerated introduction of the Ladyzhinskaya GRES amounted to about 35 million rubles.

The high-speed flow-line method developed in application to the construction of this GRES can be used fully or partially at other industrial construction sites, such as, the Ekibastuz and Kansk-Achinsk fuel and energy complexes and in the implementation of the large-scale construction program of atomic electric power stations, and for the construction of large complexes of the metallurgical, chemical, and petrochemical industries. It is advisable for the ministries and departments of the USSR to study the experience in the organization of the high-speed flow-line construction of the Ladyzhinskaya GRES and use this experience in the implementation of the program of capital construction of the Eleventh Five-Year Plan.

The construction of plants for complex preparation of gas (UKPG) No 2 and 8 at "Medvezh'ye" is an example of accelerated industrial development of one of the country's largest gas fields.

The high unit productivity of these plants and the excellence of technological solutions make it possible to prepare for transportation 3-5 million m^3 of gas a day, achieving a high degree of its desiccation (99% against 80% achieved with plants built earlier).

By making the main technological units larger and by improving the system of gas collection and the layout of the equipment, it was possible to achieve a considerable reduction in the use of metal and capital investments in the industrial system of gas collection.

The considerable remoteness of the construction sites from the main transportation systems, the seasonal nature of work, and the absence of manpower in the area have determined the selection of the complete-block method of construction, with maximum transfer of jobs from the construction site to the base conditions, as the only possible solution in these circumstances.

The production buildings of UKPG-2 and UKPG-8 had a frame-and-panel design with a light metal frame on the principle of complete block structures (BKU). The equipment and engineering systems, and the supporting and enclosing structures were combined into a single block. The enclosing structures of the walls and coverings were made from light three-layer aluminum panels with a highly effective FRP-1 insulator. The special characteristics and the complexity of the gas industry construction in Western Siberia required fundamentally new methods of labor organization. The method of brigade contracting was developed further. For the construction of UKPG-2 and UKPG-8, large self-supporting complex brigades (of up to 90 people) were created. They worked by the shift method, and their total working time was calculated.

The brigades were equipped with large machines, transportation facilities, and small mechanical equipment. The introduction of the new method made it possible to double labor productivity and to improve considerably the quality of construction; their wages increased to 135-165% in comparison with the earnings of brigades working by the traditional method.

The use of the complete block method of construction during the development of the "Medvezh'ye" gas field made it possible to shorten the completion time of the construction project to one half, to reduce capital expenditures to two-sevenths, and operational expenses to two-thirds. The construction of UKPG-2 and UPKG-8 yielded a total economic effect in the amount of 24 million rubles.

Further industrial development of vast almost inaccessible unpopulated regions of the north of Tyumenskaya Oblast and other regions of the country under the conditions of limited labor resources requires improved methods of the organization of construction and a higher level of its industrialization.

In order to achieve a full realization of the considerable potential of effectiveness of the complete-block construction, it is necessary to solve many scientific, technical, and organizational problems including the following:

to increase the unit power of power units while achieving their miniaturization;

to create large-volume multipurpose structures for oil and gas fields, land facilities for gas transportation and processing, including those on floating foundations;

to change the existing normative basis of technological and construction designing with consideration for the special characteristics of the complete-block method (the sizes of breaks and passages, the space factor of equipment boxes, etc);

to solve the problems of transporting large and heavy complete-block structures;

to ensure the changeover from supplying construction sites with individual structural units to the delivery of structures in complete sets;

to spread widely the shift-dispatch method of construction.

The level of technical and organizational solutions in the complete-block construction of the projects of the oil and gas industry makes it possible to spread it to other sectors of the construction industry. The introduction of this method has already been started in individual sectors, such as land reclamation and agricultural construction. In solving the problems of the creation of transportation facilities of great load-carrying capacities (of the order of hundreds of tons), the area of the application of this method can be used practically for all types of construction.

In order to spread the complete-block method further in construction and increase its effectiveness, it would be advisable for the Ministry of Construction of Petroleum and Gas Industry Enterprises, Ministry of the Petroleum Industry, and the Ministry of the Gas Industry, jointly with other interested ministries and departments, to develop in 1980 an "Interdepartmental Program for Further Development of the Complete-Block Method of Construction of the Enterprises of the Oil and Gas Industries" and to speed up the coordination and approval of the "Norms for Technological Designing of Structures of the Oil and Gas Industries with the Use of Blocks and Complete-Block Structures", and for the USSR Ministry of Land Reclamation and Water Resources, USSR Ministry of Agriculture, USSR Ministry of Rural Construction, RSFSR Kolkhoz Association, and the USSR Ministry of Power and Electrification, to develop and implement, starting in 1980, measures for the use of the complete-block method in construction of pumping stations, boiler rooms, compressor rooms, electric power substations, heat and gas distribution centers, and other structures on the basis of the advanced experience of the Ministry of Construction of Petroleum and Gas Industry Enterprises.

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ELECTRIC POWER

PARTS FOR SIBERIAN POWER PLANT BEGIN TO ARRIVE

Moscow PRAVDA in Russian 31 Jan 80 p 2

[Article by Correspondent I. Titov: "Hard is the Road to Sinegorsk"]

> [Text] Magadan, 30. The sea-going ferry "Sakhalin-6" entered the Bay of Nagayeva and dropped anchor not far from the moorings of the Port of Magadan this week. It had aboard the first transformer for the Kolymskaya Hydroelectric Power Plant.

The country's enterprises have begun their centralized deliveries of power engineering equipment to the pilot project. The following question arose immediately: How were we to move the huge machine units across the entire country and over two seas to Magadan? And from there to Sinegorsk there was still a 500-kilometer section of the famous Kolymskaya Motor Highway to surmount. And the cargo was heavy. It would be sufficient to point out that just the one transformer manufactured in Zaporozh'ye weighed 186 tons.

The transformer made it without incident to the port of Vanino aboard a special railroad flatcar, also manufactured by Zaporozh'ye machine builders. It was here that the decision was made to use a sea-going ferry to carry the transformer. This assignment was given to the crew commanded by Captain G. Volkov and Captain-Instructor Yu. Mikheyev.

The Bay of Nagayeva is known to freeze over. Plans were made to have the ferry escorted by the icebreaker "Vladivostok" in the last 120 nautical miles of the journey. But this help was not required. The ferry easily penetrated the ice armor and reached its destination.

A section of rail 500 meters long was prepared at the port for reception of the flatcar carrying the transformer (incidentally the total weight of the flatcar and transformer exceeds 30 tons). From here the machine unit will be dispatched aboard a special truck-trailer on its land journey across the taiga and mountains to its permanent place of rest. The motor vehicle bridges were not designed for such a load. Therefore detours and special crossings over streams and rivers will be built along the route.

The hydraulic engineers have established direct ties with the equipment suppliers, having signed agreements with them for a "working relay" competition. The appeal of the Kolyma laborers was supported by the machine building collectives. Leningrad metalworkers, for example, decided to manufacture a turbine for the all-union shock Komsomol construction project and dispatch it ahead of schedule. The plant in Zaporozh'ye produced the first transformer earlier than scheduled. And as subsequent events have shown, the initiative of these plants was honorably supported by the railroaders and seamen. Now the ball is in the court of the truck drivers. They are waiting impatiently for the truck-trailer, being manufactured at this moment by one of the plants in Chelyabinsk, to arrive in Magadan.

The Kolymskaya GES is being built by the entire country. This is revealing itself graphically in the "working relay," in the fraternal mutual assistance, and in the tremendous desire to complete all orders and instructions ahead of schedule. After all, the first machine unit of the hydroelectric power plant in Kolyma must begin producing current by the end of the year.

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ELECTRIC POWER

CONSTRUCTION OF BALAKOVO ENERGY COMPLEX STARTED

Moscow IZVESTIYA in Russian 21 Mar 80 p 1

[Article by M. Ovcharov, staff correspondent of IZVESTIYA, Balakovo, Saratovskaya Oblast]

[Text] Construction of a powerful atomic electric power station was started in the vicinity of the city of Balakovo. Here, on the banks of the Volga, will be created the country's largest power complex consisting of an AES, GES, and a pumped-storage electric power station.

We are driving along the new concrete road to the construction site of the atomic station. We left behind the Saratov GES and the blocks of high buildings of Balakova picturesquely situated near the navigable channel. Our destination is beyond the village of Natal'ino. The construction of the powerful Balakovskaya AES has been started there.

According to the head of the administration of the Saratov GES construction association, A. Maksakov, the work at the construction site is progressing in full swing. First of all, the communication lines are being laid. The automobile road is already operating, and a railroad which will carry the main flow of building materials and equipment is under construction. The electric power transmission line of the substation is ready. Water pipelines and canalization are being built. In other words, the preparation of a reliable area for the construction of the AES is nearing completion.

The builders of the main building of the atomic station have also started working. They are testing the ground for the foundation. And on the Volga, a dam is being built which will create a cooling pond with an area of 25 square kilometers. It is a very important structure: it will provide a reliable protection of the river against the disturbance of the thermal conditions.

It is of interest that the Balakov Atomic Station will be earthquake-proof. It is known that the Volga region never suffered earthquakes, and still scientists do not eliminate the possibility of earthquakes in this area once in 10,000 years!

The Balakovo Atomic Station will be operating in conjunction with a very large pumped-storage electric power station of two million kilowatts which will be built on the opposite bank of the Volga. This pumped-storage electric power station, during night hours and holidays, when the consumption of electric power drops sharply, will be operating as a pump, pumping water with the power from the AES into special pools. During peak hours, this power will be sent into the electric power network. The units of this station are very adjustable. It takes only 30 seconds to change the mode of their operation.

The construction of the AES will give the city of Balakovo a new impetus. New microrayons will grow in the city with modern buildings, schools, kindergartens, nurseries, cinemas, shops, and stadiums. Those who will come here for the all-union shock Komsomol construction job will have interesting work, good living conditions and recreational facilities.

In a few years, a new electric power source will start working next to the famous Saratovskaya GES. The atom for peace will start working.

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ELECTRIC POWER

BRIEFS

FUTURE HYDROELECTRIC PLANT--Leningrad, 30 Jan--Specialists of the Leningrad branch of the All-Union Planning, Surveying and Scientific Research Institute imeni S. Ya. Zhuk completed the engineering plans for the Bureyskaya Hydroelectric Power Plant. It will be built in Amurskaya Oblast on the Bureya River. A concrete dam more than 150 meters high will be erected in the Talakanskaya section. The capacity of the hydroelectric plant will be 2 million kilowatts. Another of the principal purposes of the hydraulic engineering complex is to protect the fertile plain of the Zeysko-Bureyskaya lowlands from flood waters. [Text] [Moscow PRAVDA in Russian 31 Jan 80 p 6] 11004

LENA POWER LINE--Yakutsk, Mar 21--Specialists of the "Vilyuygesstroy" Mechanized Column have started erecting unique supports for a high-voltage line spanning the Lena River. In the vicinity of Yakutsk the electric power transmission line will "step across" 5 kilometers of water. The line will hook the right-bank Lena up to the Yakutskaya GRES. [Text] [Moscow PRAVDA in Russian 22 Mar 80 p 1] 11004

CONSTRUCTION PLANS--An order from three ministries--the USSR Ministry of Power Machine Building, the USSR Ministry of Power and Electrification, and the USSR Ministry of Installation and Special Construction Work--dated 20 February of this year foresees measures to insure successful construction of Atommash and the city. The tasks posed this year to the builders, installers, and plant workers are presented in detail in issue No 12 (64) of SOTSIALISTICHESKAYA INDUSTRIYA. Atommash is being allocated 173,590,000 rubles for general contracting jobs. This includes 128,700,000 rubles for industrial construction and 44,890,000 for nonproductive expenses. The Volgodonskenergostroy Trust is to complete jobs worth 70,285,000 rubles through its own resources, the subcontracting organizations of the USSR Ministry of Power and Electrification are to complete jobs worth 69,265,000 rubles, and subcontracting organizations of the USSR Ministry of Installation and Special Construction Work are to finish 26 million rubles worth of work. The rest of the sum is to be assimilated by subcontractors of other ministries. [Excerpt] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Mar 80 p 2] 11005

POWER TRANSFORMER FINISHED--Zaporozh'ye--The Zaporozhtransformator Production Association has finished building a 630,000 kilovolt-ampere power transformer for the third power block of the Ekibastuzskaya GRES almost 2 weeks ahead of schedule. This year an electric machine of the same output capacity will be sent from here for the fourth block of this thermal electric power plant. Furthermore assembly of the prototype of a superpower 500 kilovolt transformer for the Smolenskaya Atomic Power Plant has now been started ahead of schedule. The association's collective has decided to raise the total output capacity of transformers produced in all of the time of their manufacture since 1947 to 1 billion kilovolt-amperes by the Lenin Jubilee. A competition has started here for the right to participate in the manufacture of the last electric machine falling within the billion kilowatt record. [Text] [Kiev PRAVDA UKRAINY in Russian 29 Mar 80 p 3] 11005

CSO: 1822

ENERGY CONSERVATION

EFFECTIVENESS OF USING FUEL, ENERGY RESOURCES IN MACHINE BUILDING

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 12, Dec 79 pp 48-54

[Article by Yu. Sibikin, Laboratory Director, VNIIKTEP, USSR Gosplan]

[Text] The Communist Party invariably devotes the most persistent attention to problems associated with economizing on material resources and using them effectively in the national economy. Observing the strictest economy is becoming the most important direction in the fight for high production effectiveness. There are tremendous possibilities for economization, of fuel and energy resources in particular, in machine building.

Analysis of the amount of fuel and energy consumed in relation to types of products for which standards are set in this sector showed that the consumption structure for all types of energy resources has remained stable in the last two five-year plans, and in my opinion it will not change significantly in the future. Heating fuel (coal, gas, petroleum products) makes up 38 percent of the total standardized consumption of fuel and energy resources, thermal power makes up 38 percent, and electric power makes up 24 percent. Table 1 shows the distribution of fuel and energy resources in relation to specific uses.

About 30 percent of the consumed energy resources are expended in the sector's production processes, and about 70 percent are expended in thermal electric power plants and boiler plants, for hot water supply, for heating, ventilation, and illumination, to support the operation of in-house transportation, to produce compressed air, and for other auxiliary needs of production. An analysis of measures submitted to the VNIIKTEP [not further identified] by the machine building ministries on long-range economization of fuel and energy resources demonstrated that some of them could be introduced successfully at enterprises of other ministries and departments, and accounted for in their long-range programs of energy resource economization.

The casting and the forging-pressing operations of the machine building sector consume fuel to melt and heat metal. About 20 percent of the fuel used for the industrial needs of casting and forging operations is consumed by steel smelting in open-hearth furnaces. The reserves of fuel economy in

Table 1

Specific Uses of Fuel and Energy Resources (According to 1975 Consumption Norms)	1975 (%)	1980 Plan (%)
Boiler and Furnace Fuel (coal, gas, petroleum products)		
Production of electric and thermal power at thermal electric power plants, and in industrial boiler plants	60	55
Support of the industrial needs of casting, forging, pressing, and heat treatment operations	25	30
Support of the production needs of construction and transportation, satisfaction of communal-personal needs	15	15
Thermal Energy		
Heating, ventilation, and hot water supply	60	55
Support of industrial needs (the work of heat exchangers, baths, steam-driven hammers, and so on	40	45
Electric Energy		
Use as locomotive force	50	50
Support of industrial needs	39	40
Lighting, as well as losses at transformer sub-stations and in power lines	11	10

Table 2

	Unit Consumption of Energy Resources in 1976 (kg Comparison Fuel Per Ton of Metal)	
	Sector Average	At the Leading Enterprises
Open-hearth steel smelting	286.0	249.0 (Uralmashzavod)
Pig iron casting	250.4	156.0 (Elektrostal')
Forging and stamping production	341.5	288.0 (Bryansk Machine Building Plant imeni 50-Letiye SSR)
Steel casting	145.9	116.6 (Novo-Kramatorsk Machine Building Plant imeni Lenin)
Heat treatment	191.4	178.0 (Uralmashzavod)

open-hearth production are: reduction of down time by improving production organization and rebuilding the open-hearth furnace shops; enlargement of the use of secondary energy resources; broader use of the oxygen lance method; improvement of the quality of the furnace charge; reduction of the assortment of smelted steels. The unit consumption of energy resources per ton of smelted open-hearth seal is significantly lower than the sector average at the best enterprises, for example the Uralmashzavod [Ural Heavy Machine Building Plant imeni Ordzhonikidze] (Table 2).

Machine building industry uses a large quantity of fuel in cupolas to smelt pig iron. As a rule, cupolas operate irregularly with cold air, depending on the need for pig iron. Induction crucible electric furnaces are more up-to-date, and they are becoming the principal smelting machine unit, particularly abroad. Unit fuel consumption in iron casting production may be reduced in the sector by outfitting the cupolas with recuperators or air heaters, by partially replacing them with induction furnaces, and by making broader use of liquid self-hardening mixtures to manufacture molds and rods, which would eliminate consumption of fuel for drying.

Cupolas are witnessing worldwide modernization taking the form of installation of two rows of oxygen lances (instead of one) with air distributed about equally between them. Implementation of such a measure could reduce coke consumption by 20-30 percent and increase cupola productivity by 10-25 percent.

Steel smelting production consumes a large quantity of electric energy. Electric-arc furnaces with capacities varying basically from 1.5 to 12 tons have been installed at the machine building plants. Most of the furnaces are furnished with automatic input power adjustment systems.

The unit consumption of electric power to smelt steel in the sector's electric-arc furnaces is the same as in the USA and England (about 700 kw·hr/ton); however, certain foreign companies have reduced these outlays by 20-25 percent by introducing fuel-oxygen burners that furnish additional heat the furnace during melting of the charge, and by using fettling buckets to heat the charge initially (before reaching the furnace), using either burners or exhaust gases. The practice of heating the charge before reaching the furnace was recently introduced at the Elektrostal' Plant. As a result unit consumption of electric energy was decreased by 10 percent, the smelting time was decreased by 5 percent, and concurrently the yield of useable metal increased by 2 percent.

Unit consumption of electric energy could be reduced further in electric steel smelting production by broadening the use of oxygen, improving the quality of the charge, and improving production organization.

The bulk of the fuel used in the sector's industrial processes is required for the heating and heat treatment of metals. Here again the reserves of economy are large. Unit fuel consumption (per ton of metal) in the forging and stamping operations of the Bryansk Machine Building Plant imeni

50-Letiye SSR was 288 kg of comparison fuel in 1976, while the sector average was 341.5 kg of comparison fuel. The effectiveness with which fuel is utilized in this group of industrial processes may be increased by 20-35 percent by improving the burners, regulating the combustion processes, raising the loading factor, and changing furnace design. Depending on the type of heat treatment employed, the efficiency of thermal furnaces varies within 3 and 25 percent, and unit fuel consumption varies from 100 to 800 kg of comparison fuel per ton of metal. Its reduction may have been promoted by centralized production of high- and low-temperature furnaces with lightened fettling, in which the unit fuel consumption could be reduced to 150-200 kg comparison fuel per ton of metal.

The reserves of fuel economy in forging-pressing and thermal operations are being placed into action not only by improving furnace structure and production organization but also by introducing new industrial processes producing semifinished products of greater precision for the most part. The sector's forging operations are beginning to introduce automated forging complexes in place of steam-driven hammers. Given a rise in forged piece precision to ± 2 mm, use of this type of equipment reduces energy consumption by a factor of four in comparison with the energy consumption of steam-driven hammers of the same productivity.

There are plans for introducing other measures as well reducing unit fuel consumption to manufacture forgings and to heat-treat metals, to include in particular: conversion to production of longer ingots; utilization of the heat produced by the forging operation, rough-working of shaft forgings while still hot, which increases metalworking productivity by 8-10 times; introduction of radial-forging machines in place of free-forging hammers and presses, which would economize on metal by 10-12 percent and raise forging productivity by 5-6 times, as well as reduce consumption of thermal energy for heating purposes by 2-3 times. Labor productivity can be raised by 8-10 times and metal can be economized by 5-8 percent by replacing free forging and stamping by transverse tape rolling of blanks such as large stepped shafts with a diameter up to 100 mm.

In addition to the listed measures for economizing on fuel and energy resources, there is special interest in disseminating the best experience of making sensible use of energy resources, as foreseen by the economization program of the Ministry of Heavy and Transport Machine Building and in other sectors.

Extensive introduction of the experience the Vysokogorsk Mechanical Plant has enjoyed in raising the effectiveness of heat-treating blanks by modernizing the series-produced PN-34 resistance shaft furnace for nonoxidative heating would make it possible to reduce furnace metal loss from 2-2.5 to 0.2-0.5 percent and consequently insure a significant savings of electric energy, the size of which could be evaluated with the following computations.

Raw data: established furnace power $P = 80$ kw; number of charges per day $n_c = 4$; number of working days per year, 261. Following modernization, the charge processing time decreased from $T_c = 4$ hours to $T_c = 0.7$ hours, and the furnace hot time increased from $T_{p1} = 1$ hour to $T_{p2} = 2$ hours.

Annual electric energy consumption is:
before modernization

$$W_1 = P\,(T_{c_1} n_c + T_{p_1})\,261 \text{ kw·hr;}$$

after modernization

$$W_2 = P\,(T_{c_2} n_c + T_{p_2})\,261 \text{ kw·hr.}$$

The annual savings of electric energy in the sector due to modernization of N furnaces is

$$\Delta W = (W_1 - W_2)\,N \text{ kw·hr.}$$

Parts are presently case-hardened with natural gas in liquid carbonizer at a temperature of 920°C in the course of several hours.

Because the assortment of parts has expanded, production has increased, and the need for raising labor productivity and improving the quality of heat-strengthening has arisen, today's case-hardening processes have ceased to satisfy the requirements imposed upon them.

Jointly with the Novo-Kramatorsk Machine Building Plant imeni V. I. Lenin, the Kramatorsk Scientific Research, Planning, and Technological Institute of Machine Building (NIIPTmash) has introduced a device for gas case-hardening to be used with a brand Ts-105 shaft furnace, employing natural gas as the carbonizer. This made it possible to reduce the length of the production process, raise furnace productivity by 10-12 percent, decrease unit consumption of electric energy by 15-20 percent, and improve the hygienic conditions of the work.

The savings of electric energy resulting from introduction of gas case-hardening of parts can be computed as follows.

The quantity of charges per year associated with kerosene case-hardening of parts is

$$n_1 = \frac{N}{m},$$

where N is the weight of parts subjected to case-hardening for a year, kg, and m is the average charge weight, kg.

Given an annual number of charges n_1, the time spent on kerosene case-hardening is

$$T_1 = t_1 n_1,$$

where t_1 is the time parts are kept in the furnace during their kerosene case-hardening, hours.

When parts are case-hardened with natural gas the time they remain in the furnace, t_2, decreases by 1 hour in comparison with kerosene case-hardening, and the number of charges per year reaches n_2.

Consumption of electric energy for one charge in relation to kerosene and natural gas case-hardening of parts would be, respectively,

$$W_1 = Pt_1,$$
$$W_2 = Pt_2,$$

where P is the electric power required by the case-hardening system, kw.

The annual savings of electric energy resulting from introduction of N new case-hardening systems into the sector would be

$$\Delta W = (W_1 - W_2)\, n_2 N \text{ kw·hr}.$$

Injection of oxygen into the charge in electric-arc steel smelting furnaces significantly reduces the time of the charge smelting and oxidizing process. The resulting savings of electric energy may be computed by using the following raw data:

	Smelting Time (t_n), hr	Consumption of Electric Energy for Smelting (W_n), kw·hr)
Furnace with acid fettling: .		
Without injection	1.58	3700
With injection	1.17	2575
Furnace with basic fettling:		
Without injection	3.17	4050
With injection	2.85	3610

Assume the following for all categories of furnaces: operating time--24 hr//day; number of working days per year--261. Then the quantity of smelting operations per year would be

$$n = \frac{6264}{t_n}$$

The annual savings of electric energy from smelting steel in N modernized furnaces employing oxygen injection would be

$$\Delta W = (W_1 - W_2)nN \text{ kw·hr},$$

where W_1 and W_2 are consumption of electric energy for one smelting operation correspondingly without injection and with injection, kw·hr.

Use of built-in regulating apparatus to control blower productivity: A blower's adjustability is one of the most important factors influencing the operational economy of the system. Use of built-in regulating apparatus developed by the Soyuzkhimpromenergo Production Association reduces electric energy consumption by 12-15 percent. Considering that energy consumption for ventilation is 7-10 percent of total consumption, we can compute the savings of electric energy resulting from introduction of this measure over the long range.

Introduction of automatic exterior lighting control would produce an annual electric energy savings of

$$\Delta W = p\Delta t,$$

where p is the power consumed by exterior lighting fixtures, kw, and Δt is the time of electric energy consumption saved over a year period following introduction of automatic control, hr.

Introduction of compressed air cleaning: Presence of moisture, oil, and other mechanical impurities in compressed air causes intense corrosion, which causes the air-tightness of the pneumatic system to deteriorate and consumption of air within it to increase by 20-30 percent due to leakage. As a result capital outlays to build additional compressor facilities increase by 20-25 percent.

Devices that clean compressed air by condensing and subsequently removing moisture by cooling have recently enjoyed broader acceptance. Such refrigerating units are now being used at the Volga Motor Vehicle Plant and the Moscow Plant imeni Leninskiy Komsomol. In comparison with the UOV absorption devices produced by the Kurgan Machine Building Plant imeni Lenin they consume about six times less electric energy, preclude consumption of compressed air for purging, they are smaller, and they weigh less. Let us calculate the corresponding savings of electric energy using the following data:

Type of Turbocompressor	K-250	K-500
Productivity (Q), m^3/min	250	500
Annual operating time (t), hr	6,500	5,600
Unit electric energy consumption to produce compressed air, kw·hr/1,000 m^3:		
Prior to introduction of refrigeration unit (W_1)	115	107
After introduction (W_2)	117	109
Reduction of compressed air losses following introduction of refrigeration unit (P), %	25	25
Number of turbocompressors furnished with refrigeration units	n_1	n_2

The annual expenditure of compressed air is:

prior to introduction of the refrigeration unit

$$Q_r = Q \cdot t \cdot 60$$

after introduction

$$Q'_r = Q_r - Q \frac{P}{100}$$

As a result the annual savings of electric energy resulting from introduction of one unit is (in kilowatt-hours)

$$\Delta W_1 = W_1 Q_r - W_2 Q'_r$$

For all of the sector's enterprises this would be

$$\Delta W = \Delta W_1 n_1 + \Delta W_2 n_2$$

The proposals on economization of fuel and energy resources developed by the Ministry of Power Machine Building and the Ministry of Machine Tool and Tool Building Industry show that correct choice of the variants of mechanical part working is an important factor in raising the effectiveness with which electric energy is used in machine building. The outlays on electric energy for power vary from 1.3 to 16.4 percent of the total mechanical working cost for lathes, and for 14 to 21 percent for automatic machines.

An analysis showed that the conditions under which parts are worked, the part working rate, the feed rate and cutting depth, and the type of operation (finishing, roughing, semifinishing, and so on) have a significant influence upon economization of electric energy. Depending on their variation, the power consumed by a machine tool's electric drive may increase or decrease by five orders of magnitude, while the efficiency of electric devices may vary by more than two orders of magnitude. When the feed rate and the depth and rate of cutting are doubled, the amount of electric energy needed drops by 33-38 percent in comparison with the initial variant.

The variant of mechanical part working that is optimum from the standpoint of the effectiveness with which electric energy is used requires correct selection of the following: the material of the blank (forged piece, stamped piece, rolled metal, or casting); the working method (milling or planing, knurling or threading, drilling or broaching); the equipment to be employed (general-purpose, special, unitized, automatic); the geometry and material of the tool; the work procedures and methods (single- or multi-staged servicing, single- or multiple-tool working); the machining conditions.

The consumption of electric energy (in kilowatts-hours) in any mechanical part working operation may be defined in general terms as the sum of the outlays during the machining time and the idle time:

$$W = \sum_{i}^{i} \frac{P_p \tau_p}{\eta_i \eta_e} + P'_x \tau'_x + P''_x \tau''_x .$$

where P_p--power consumed during machining in the i-th mode, characterized by particular machining parameters;

$\eta_i \cdot \eta_e$ --efficiency of correspondingly the machine tool and the electric motor, given a corresponding load during the machining process;

τ_p--machining time;

P'_x and P''_x--power consumed by the machine tool while idling, correspondingly forward (in the working direction) in time τ'_x and backward in time τ''_x.

The amount of electric energy consumed in a part working operation is defined as the amount of power consumed during machining and in idle gears, and by the duration of the elements of the operating cycle.

Replacement of planing by milling reduces consumption of electric energy by 30-40 percent. Reduction of tolerances on metallic blanks by, for example, precision casting would result in an electric energy savings of up to 50 percent. Introduction of part upsetting and electric upsetting in place of their processing by machine tools could produce the same savings.

The analysis made by the VNIIKTEP of the ways for raising the effectiveness with which fuel and energy resources are used showed that realization of the most important directions of scientific-technical progress in machine building should insure, in the long range, a savings of fuel and energy resources totaling 65-75 million tons of comparison fuel, in the proportions indicated in Table 3.

Table 3

Economization Strategy	Fuel (%)	Thermal Energy (%)	Electric Energy (%)
Introduction of new equipment	33	26	34
Improvement of production processes	28	10	32
Automation, improvement of part working conditions	7	31	20
Modernization of existing equipment	11	11	4
Utilization of secondary energy resources	17	18	-
Other measures	4	4	10

Research has shown that implementation of measures associated with scientific-technical progress in machine building would significantly improve the use of fuel and energy resources, thus increasing the overall effectiveness of energy resource economization measures.
[97-11004]

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ENERGY CONSERVATION

WASTE OF GAS FUEL IN INDUSTRY DISCUSSED

Moscow EKONOMICHESKAYA GAZETA in Russian No 17, Apr 80 p 16

[Article by V. Varavka, Chelyabinsk-Gor'kiy-Vladimir; "Gas Warms the Sky"]

[Text] The gas industry is not only the youngest, but also one of the rapidly developing branches of industry. The high-energy hygienic "blue fuel" is used effectively today at thousands of various enterprises. It is used in millions of apartments, including the remotest populated centers in forestless steppe regions. In comparison with 1960, the extraction of gas in the country increased ninefold, reaching 407 billion cubic meters last year.

Such a pace supported by reliable explored resources pleases all consumers. The work of people opening up the access to reach resources and making it possible to transport the priceless gifts of nature at great distances deserves universal admiration.

However, in spite of this tremendous progress, it would be unforgivable to overlook those serious defects which will be discussed below, such as wasteful consumption of gas on the part of some workers.

Improper Utilization

The Gor'kiy territorial office of Gosgaznadzor [Department of the State Gas Inspection] was checking 20 enterprises of Vladimirskaya Oblast several months ago for their use of gas. Skilled controllers of this office encountered numerous facts of mismanagement. The equipment was not used properly, there were no operation mode charts and automated devices for combustion control, and secondary power resources were not utilized. Here are two examples.

In the settlement of Kurlovskoye, at the Glass Plant imeni Volodarskiy, after the completion of technological functions, the burned gas with a temperature of 700 or 800 degrees (!) escapes into the atmosphere. It pollutes the air, and, moreover, the heat which could be used for heating a boiler room, housing facilities, or a greenhouse for growing vegetables is being wasted. The same situation was at all other plants supplying building materials, for example at the brick plant in Murom. Five thousand gigacalories a year are wasted here, which is equivalent to 750,000 cubic meters of natural gas.

On the whole, the losses in this first-class fuel as a result of its improper burning only in the group of the inspected plants of one oblast amounted to over 32 million cubic meters for one year. Is it not too much? Is it not a careless and irresponsible attitude toward something that costs us a lot and, which is most important, is, unfortunately, not renewable? Calculations have shown that industrially developed cities have sufficient amounts of secondary heat after the burning of gas in furnaces of plants for growing onions, radishes, parsley, and cucumbers in sufficient amounts during the cold months of the year. Almost every enterprise can build hothouses and supply them with steam which is essentially free. Vladimir Pavlovich Buyanov, head of the Gor'kiy Inspection said that wasted heat can be used also for heating concrete, administrative and production buildings, warehouses, and other buildings.

Losses of heat into the atmosphere are particularly great at metallurgical and machine-building plants which consume the lion's share of the natural gas supply. In Chelyabinskaya Oblast, they consume four-fifths of thirteen billion cubic meters of gas and, due to a low utilization factor, they heat with it not only furnaces but also... the sky. These wasted calories could be heating plantations of sheltered ground, flower hothouses, raise the temperature of the air fed to the burners, and, thus, reduce greatly the overall consumption of natural gas.

At the Chebarkul' Metallurgical Plant, almost all furnaces have the so-called recuperators. Being heated by waste heat, they, in turn, heat considerably the air drawn in for the formation of the flame. These relatively inexpensive devices initiated by thrifty people reduced the consumption of gas by 10%.

Thus, there is available experience, even if it is not entirely faultless, which can be used by almost all metallurgical works, regardless of the administrative affiliation of the enterprises. Why then the interested ministries, such as the USSR Ministry of Nonferrous Metallurgy and Ministry of the Gas Industry are not very anxious to use it? Wherever the national interests are concerned, such as an annual saving of hundreds of millions or even of billions of cubic meters of gas, people should not do arbitrarily what they want. On the contrary, it is necessary to mobilize creative efforts and all potentialities of scientific research institutes, design bureaus, inventers, efficiency experts, and, of course, the sharp eye of the party organizations at the plants. Enterprises should not wait for instructions from superior organizations, but to act on their own in order to avoid wastes.

Step-by-step utilization of secondary heat is very effective. After the main technological cycle, it passes through a superficial and then a contact economizer. Water saturated with carbon dioxide is suitable for washing dishes and, when slightly diluted, is very effective for watering vegetables, increasing their yield. After this double use, the air escaping into the atmosphere has a temperature of only 30-40 degrees.

Such very economical schemes are not a designer's imagination. They are entirely realistic and exist in practice. However, there are, unfortunately, very few economizers, and their operational characteristics, according to specialists, are very poor. Evidently, the central planning agency should see to it that these devices of various sizes and modification are produced industrially in large quantities. The relatively small expenses on their production will be recovered in a short period of time through effective use of large amounts of heat which is being wasted at the present time.

Poor Designing

Seven years ago, a very good procedure pertaining to the utilization of secondary fuel and energy resources was established. The regulations stated that the Gosstroy, ministries, and departments must not approve designs of new enterprises and technological units which have no provisions for the use of the accompanying heat. If such facilities are built, it is prohibited to accept them for operation until all their defects are removed.

Unfortunately, due to lack of control over the organizations placing the orders and the designers, this exceptionally important instruction is very often disregarded. In 1976, all blueprints for the Gus'-Khrustal'nyy Fiberglass Plant were approved by the experts of the USSR Ministry of the Chemical Industry. They saw that gases heated in furnaces to 800 degrees were not utilized further. They agreed that it was bad but did not correct the mistake. As a result of the poor performance of the designers, administration, and supervisors from the ministry, this enterprise loses 7.2 million cubic meters of gas a year.

A somewhat similar situation exists at the present time in the sovkhoz "Kud'ma", Bogorodskiy Rayon, Gor'kovskaya Oblast. The institute "Gor'kovgiproselstroy" [Gor'kiy State Planning Institute for Rural Housing and Civil Engineering Construction] is designing a self-contained boiler room, but they are going to install independent burners in the hothouse for obtaining carbon dioxide which stimulates the growth of plants. It would be much simpler and cheaper to install a contact economizer near the boiler in order to have abundant supply of enriched water for watering the plants.

When the workers of design organizations and directors of enterprises under construction are asked why they "forgot" about the secondary power resources, they give the same answer: firstly, they could not find the necessary standard designs, and, secondly, it is not easy to get the metal for the waste utilization devices.

In general, their arguments are weighty, although they use them sometimes to cover for their lack of initiative, unwillingness to give the designs more thought and prepare simple drawings. At the same time, it would be wrong to deregard the complaints. Often they are not unfounded and deserve close attention on the part of the Gosstroy and Gossnab [USSR State Committee for Material and Technical Supply].

Technology and Norms

Losses of gas are very great when it is burned without observing the established rules. According to Dmitriy Ivanovich Chernov, chief engineer of Chelyabinskaya Oblast Gas Administration, due to a partial elimination of such violations, they saved about 21 million cubic meters of fuel last year.

Much gas is lost because industrial burners are not designed well and, in addition are made in a rather primitive way. Quite often, furnaces are not fed with adequate amounts of oxygen-rich air, which unavoidably results in incomplete combustion of the fuel. For example, the losses from poor combustion at the forge shop of the Vladimir Electric Motor Plant amounted to 20%. Uneconomical boilers due for replacement are sometimes used. Some plants are using outdated energy-intensive technologies for metallurgical, chemical, and other processes.

These facts are discussed at enterprises and in the ministries, however, no cardinal measures are implemented because, on the one hand, gas is supplied at an economically unjustifiable low price and, on the other hand, its consumption norms are too liberal.

At the Gor'kiy Automobile Plant, natural gas constitutes 2.8% of the production cost of forging, and only 1.7% in the production of springs. Many enterprises of the Volga region and Urals which I know include the cost of gas into the general energy costs when they calculate their expenses. And at the Kovrov Silicate Plant and Vladimir Ceramic Plant, they do not bother at all to include such "trifling" expenses. The economic departments of these plants which should be strengthening their accounting system play a role of passive observers and not strict controllers.

In fact, well substantiated norms for gas consumption which would compel the management to value it just as the equipment and materials are still rare. The norms that are being used are chiefly approximate and very liberal, and there are no sectorial and intersectorial norms even for standard and old technological processes. The norms at the automobile plant mentioned above are different from those at the plant "Krasnyy Sormov" or at the Vyksa Metallurgical Plant. The differences in the machine-building, construction-material, and chemical industries are still greater. With this situation, thriftiness or mismanagement of the enterprises can be judged only by comparing the present indexes with last year's indexes. In other words, the "achieved level" has to be used as a measure of improvement, which, as is known, is not a perfect criterion.

There is still more negligence in the supply of gas to shops, sections, and large individual units and calculation of their consumption. There are no metering devices and, therefore, power engineers (or mechanics at medium-size enterprises) calculate fuel consumption by methods which are not at all accurate.

Normalization and calculation of gas consumption for municipal and domestic services to the population also need radical improvements. This item is very modest and much smaller than the expenses in industry. However, at the present rate of the development of gas facilities in our country, it is measured not by millions, but billions of cubic meters, which, naturally, have to be carefully accounted for.

Unfortunately, today, it is nothing but wishful thinking. The amounts of gas supplied to housing administrations and operation offices are not measured accurately and no one knows their exact consumption, because there are no meters even for bulk supply, and the consumption volumes of the fuel and the payments remain the same. The same meager fee is charged for one burner burning two hours a day or four burners burning from morning to evening. The highest gas consumption is in the autumn due to delays in the operation of heating networks and inefficiency of housing offices. The excessive consumption of gas was over 30 million cubic meters in the group of cities in the Upper Volga Region in September-October of last year!

It stands to reason that it is impossible to organize the normalization and calculation of the use of secondary heat without reliable and compact gas meters, good calorimeters and, as has already been mentioned above a large number of various economizers. Delays with the organization of mass production of this equipment will result in unnecessary losses of the excellent fuel and raw material for chemistry.

At the same time, it is necessary to check the condition of distribution networks everywhere in order to eliminate the leakage of gas, to compile rational schedules for its supply to the consumers, and not to allow ineffective burning. As was stressed in the resolution of the CPSU Central Committee regarding the work of the Pavlodarskaya Oblast party organization on the fulfillment of the resolution of the CPSU Central Committee on the conservation of fuel and energy resources at enterprises and construction sites, it is necessary to nip in the bud any manifestation of mismanagement and to increase sharply the conservation of fuel and energy resources, including secondary resources. As we can see, there are tremendous possibilities for this.

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MINISTER OF THE OIL INDUSTRY REVIEWS PROGRESS, PROBLEMS

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 4, Apr 80 pp 3-8

[Article by Minister of the Oil Industry N. A. Mal'tsev: "1980--Final Year of the 10th Five-Year Plan"]

> [Text] "The course of history and the deepest transformations that have radically altered the appearance of the modern world bring more and more new proofs of the legitimacy and invincible strength of the Leninist ideas."
>
> (From the decree of the CPSU Central Committee "On the 110th Anniversary of the Birth of Vladimir Il'ich Lenin")

The Soviet Union has entered the final year of the 10th Five-Year Plan, the year in which all progressive mankind marks the 110th anniversary of the birth of Vladimir Il'ich Lenin. The birthday of V. I. Lenin, the creator of the Communist Party of the Soviet Union and the founder of the world's first socialist state enters into history as the day for summarizing the results of the communist construction in our country.

The time that has elapsed since the beginning of the five-year plan has been marked with the persistent, creative labor of the Soviet people. Under the leadership of the Communist Party the workers of the country have persistently worked to fulfill the decisions of the 25th CPSU Congress.

A deep and comprehensive analysis of the development of the country's national economy during the 4 years of the five-year plan, urgent tasks facing the Soviet economy in 1980 and the paths to solving them are stated in the speech of the General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev at the November (1979) Plenum of the CPSU Central Committee. During this time the production of industrial products as compared to the same period of the last five-year plan increased by 600 billion R, the national income by 323 billion R, and the real incomes per capita by 13.3%.

However, as Comrade L. I. Brezhnev noted at the Plenum, far from everything that was noted in the plans has been achieved. The main cause of the shortcomings is the fact that not all the ministries and departments were able to overcome the inertia force and decisively turn work towards an increase in quality and achievement of the best final results.

An important contribution to the development of the country's national economy was made by the workers of the oil industry. In 1976-1979 oil extraction with gas condensate rose by 94 million T. A considerable number of new facilities were put into operation for oil extraction, 10,700 km of main oil pipelines, 100 oil pumping stations, 8 billion m^3 of machinery in gas refineries, and a number of other facilities. The volume of operational drilling increased from 8.6 million m in 1975 to 13 million m in 1979.

Oil extraction continued to develop at high rates in West Siberia. During the elapsed period of the five-year plan here 25.4 million T of oil more were extracted than provided for by the assignments of the five-year plan.

The collectives of the associations Tatneft', Bashneft', Kuybyshevneft', Stavropol'neftegaz, Gruzneft' and others are working on the level of and with an exceeding of the five-year plan assignments.

At the same time, the associations Mangyshlakneft', Turkmenneft', Belorusneft' and Komineft' have not provided the level of oil extraction planned for the five-year plan.

The introduction of new plants for gas refining has made it possible to raise the level of its use on the whole for the branch from 57.8% in 1975 to 69% and more in 1979.

A considerable contribution to the development of oil and gas extraction, increase in the efficiency of drilling and geological-exploratory work, further perfection in the organization of labor and control of production has been made by the workers of the scientific research and planning institutes.

In 1976-1979 in the branch 3.415 million m^2 of living area were introduced for 20,850 places in kindergartens and 27,848 places in schools, 1,515 hospital beds and 9,312 attendances in shifts of the polyclinics, and 3,150 places in clubs.

However, the plans of residential and social-general construction were not fulfilled, which affected the formation of the production collectives in the branch. Especially great lags were permitted in the associations Nizhnevartovskneftegaz, Surgutneftegaz, Yuganskneftegaz and others.

In the attained successes for increase in oil extraction in the country a significant role belongs to the leading collectives, the leading workers of production and the great organizational work for the development of socialist competition.

The oil workers of the branch received the greeting of General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev to the drillers of Nizhnevartovsk UBR [drilling administration] No 1 and the Surgut UBR No 2 with great inspiration. The greeting was widely discussed in all the drilling organizations and increased socialist commitments were adopted.

On the eve of the 62nd anniversary of the Great October the collective of Nizhnevartovsk UBR No 1 reported the fulfillment of the program for 4 years.

Good results were achieved in 1979 on tunneling wells by the collectives of the associations Bashneft', Udmurtneft', Grozneft', Stavropol'neftegaz and others.

Socialist competition for the worthy meeting of the 110th anniversary of the birth of V. I. Lenin unfolded in a situation of high activity and mass enthusiasm in all the collectives of the enterprises and organizations of the branch.

The motto of the leading collectives--"Fulfill the assignments of the five-year plan by 22 April 1980."

Already over 140 collectives have reported the completion of the five-year plan assignment. Among them are the brigades led by foremen Heroes of Socialist Labor G. M. Levin, A. D. Shakshin, USSR State Prize laureate V. T. Gromov, V. I. Shchava of the Glavtyumenneftegaz, Hero of Socialist Labor I. G. Feklov and M. G. Drozdov from the association Kuybyshevneft', G. A. Shulikin from the association Grozneft', Lenin komsomol prize laureate A. S. Prokayev from the association Orenburgneft', S. V. Melekhin from the association Komineft', Hero of Socialist Labor S. Nagiyev from the association Azneft' and others.

Important tasks for the further increase in oil extraction face the branch in 1980. This year extraction of oil with gas condensate for the country is planned in a volume of 606 million T, i.e., 3.6% more than in 1979, and extraction of natural gas in a volume of 435 billion m^3.

To attain the level of oil extraction with gas condensate planned for the branch it remains to drill and put into operation 6,792 oil and 1,344 injection wells with total meterage about 17 million m, which is 4 million m more than in 1979, and assimilate over 6.8 billion R of capital investments including 2.7 billion R for construction-installation work.

In order to successfully fulfill the assignment for the development of the oil industry all the forces, as indicated at the Nove[illegible]979) Plenum of the CPSU Central Committee must be concentrated on t[illegible]tions, and it is necessary to adopt measures to improve the activity [illegible] all the enterprises and organizations of the branch, and increase the effectiveness and quality of all the work.

A decisive condition in the stable work of the oil extracting region and the branch as a whole is the strict fulfillment of the technological plans for the development of each oil well, each bed and the field as a whole. Here precisely are hidden the main reserves for guaranteeing the current oil extraction and attaining the highest oil output.

Under conditions of the active effect on the bed of oil by water, and the ever broader introduction of new methods of increasing the oil output at each stage of development it is necessary to have timely fulfillment of the entire complex of work inherent to it. Guarantee of the required scope of the effect of the developed deposits and fields both with respect to the thickness of the beds and the area is the main factor in the successful work of the oil extracting enterprises.

Here of great importance is the setting up of research work for pinpointing the projects for development and timely assignment and fulfillment of new technical measures. The interests of the matter require the unfailing implementation of author's control on the part of the scientific research and planning institutes over the fulfillment of all the technological solutions.

Both the head branch institutes and the territorial NIPI [scientific research and planning institute] must focus special attention on questions of developing the complicated deposits of West Siberia and other regions.

A guarantee of the successful fulfillment of the set assignments for oil and gas extraction is the effective use of the main funds of the branch, the wells.

In recent years definite work has been done to improve the use of the well fund. In the 4 years of the current five-year plan the inactive fund of oil wells on the whole for the branch was reduced from 3.0 to 2.6%.

However, not all the associations are working equally. Thus, with equal conditions in the associations Bashneft' and Tatneft' the inactive fund of wells is respectively 1.1 and 1.9%, and in the associations Permneft', Tomskneft' and Glavtyumenneftegaz respectively 4.3, 3.2 and 2.9%.

The main cause of the presence of a comparatively large number of standing wells is the insufficient quality of their maintenance and repair, as well as the maintenance of the field objects and repair of equipment. Thus, in the Glavtyumenneftegaz and the association Kuybyshevneft' repeated repairs comprise over 7% of the maintenance work done on the wells. Their percentage is also great in the associations Permneft', Orenburgneft', Tomskneft', Azneft' and Ukrneft'.

A considerable part of the maintenance work is done due to the unsatisfactory regulation of the devices for protection of the UETsN deep-well electric motors and the adjustment of the control stations on the mechanized wells.

The insufficient attention of individual leaders of the associations, NGDU [oil and gas extracting administration] and fields to the competent selection of sucker rod columns results in their premature rupture, folding, etc.

The work of the association Bashneft' can serve as a positive example of the operation ShGN [sucker rod deep pump] wells, where, having analyzed and revealed the causes of the frequent repair of a certain fund of wells, selection of the sucker rod columns was adjusted and their certification was organized. As a result, in recent years the ruptures of the rods, and consequently the repairs were significantly reduced.

Special attention and the most energetic measures are required for the fulfillment of measures to reconstruct and conduut major repair on the power transmission lines and substations in the fields.

The introduction of new wells has a great effect on the increase in oil extraction in the branch. In 1979 the plan for drilling and introduction of the wells was not fulfilled. The greatest lag occurred in the Glavtyumenneftegaz, the associations Komineft', Tomskneft', Permneft', and Orenburgneft'. Here one should note in addition to the nonfulfillment of the plan for drilling the very long testing of the wells, building and putting them into operation. In this respect in all regions measures should be taken for the advance building up of new wells, and the work should be organized such that each drilled well is rapidly put into operation and yields oil.

As noted, in 1980 the volume of drilling producing wells needs to be increased by 4 million m, of them 3 million m in the Tyumenskaya oblast. This important task faces both the drilling organizations of the Glavtyumenneftegaz and the drillers of the associations Tatneft', Bashneft', Kuybyshevneft;, Saratovneftegaz, Ukrneft' and Belorusneft' working in West Siberia on the watch-expedition method. The fulfillment of this assignment is possible on the condition of the use of the available resources, high organization, and strict technological and labor discipline.

The leading drilling brigades of the Glavtyumenneftegaz have surpassed the boundary of the annual drilling footage of 90,000 m, many collectives of the Siberian drillers and drillers of the contract organizations have reached drilling footage of 40,000-60,000 m. However, an even greater number of brigades here have an annual drilling footage from 20,000 to 40,000m, and certain even less than 20,000 m. The main reserve for increasing the drilling footage in West Siberia is complete loading and increase in the occupational skill of the drilling brigades. It is necessary to take all measures in order to build up the areas for drilling work in time (construction of power transmission lines, roads, foundations under the boreholes, installation of drilling units). The creation of conditions for highly productive labor of the collectives makes it possible to count on the attainment of annual drilling footage of 8 million m.

Such potentialities for an increase in the volumes of drilling work are present also in other oil extracting regions. The more so since in the branch 60 UBR out of 115 and 376 drilling brigades out of 1246 have not fullfilled the plans in 1979.

In this respect each leader must clearly show that it is possible to increase the volumes of drilling by means of a further increase in commercial rates, output for the brigade for the year and the most complete use of the technical resources, technology and labor organization available at the given moment. And this in the first place must be considered in the associations Komineft', Permneft', Mangyshlakneft', Embaneft', Turkmenneft' and a number of others where in 1980 growth in the volumes of drilling work has been planned.

In 1979 the geologists of the branch discovered 33 oil, oil-gas and gas fields, revealed 49 new deposits, including 41 oil. Twenty-three oil fields have been prepared for industrial development. New geological data have been obtained mainly confirming the correctness of the directions in the geological exploratory work and making it possible to expand the search for new fields in a number of oil and gas extracting regions of the country.

However, it is impossible to consider that in the branch everything has been done for the scientific substantiation of the geological work and the reliability of the results of the geophysical research. In the first place this refers to Georgia, Turkmenia and a number of other regions.

It is especially important in the regions where extensive factual geological material has been accumulated to deeply and correctly analyze it and scientifically substantiate the futher work.

Great responsibility for the supplementing of the branch resources lies on the geophysical and drilling organizations, the IGiRGI [Institute of Geology and Development of Mineral Fuels] and the geological services of the associations and institutes.

At the November (1979) Plenum of the CPSU Central Committee General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev gave a lot of attention to that major state problem of capital construction. And in the development of our branch construction and the introduction of the facilities in the planned periods have one of the decisive values in attaining positive final results in increasing the extraction of oil and gas.

During the elapsed period of the five-year plan certain advances have been made in capital construction in the branch. However, its condition cannot satisfy the oil workers.

In the past the 1979 plan of capital investments was fulfilled by 92%, and the construction-installation work--by 85%. A considerable lag was allowed in the construction of nonproduction facilities. Residences totalling 400,000 m^2 of space were not put into operation, of them about 300,000 m^2 were in West Siberia, i.e., precisely in that region where they are especially needed. Nonproduction construction is lagging also in such a developing region as northern Komi ASSR.

The main cause of the nonfulfillment of the plan for capital construction is the lagging development of the outputs of the construction organizations of the contract ministries. At the same time one should note that not everything has been done for the successful fulfillment of the assignment of the purchasing enterprises of the branch. In this respect it is very important during the formation of the plan of capital construction to concentrate resources on the facilities to be introduced.

In 1980 the volumes of construction will sharply rise, the capital investments by 19% and the construction-installation work by 31% as compared to the actual assimilation in 1979. Work to be done by the in-house construction organizations will be increased by 22%. An especially great volume of work (about 60% of the total volume) remains to be done in West Siberia, on the peninsula of Mangyshlak, in the Komi ASSR and in the Permskaya oblast. Under these conditions it is necessary to sharply elevate the role of the customer as the organizer of the entire process of construction, and precisely the customer in the first place must clearly and timely fulfill his commitments.

For the majority of the oil extracting regions, thanks to the construction of facilities for collection and preparation of oil gas, as well as the gas refineries the degree of its use is currently 85-95%. However, in West Siberia and the Komi ASSR the resources of oil gas are still used roughly by half. To attain in 1980 a level of gas use of 80-95%, as provided for by the decisions of the 25th CPSU Congress, it remains to complete construction and assimilation of the Nizhnevartovsk GPZ [gas refinery] No 4, Yuzhno-Balyk, Belozernyy, and Surgut GPZ, as well as the Usinsk compressor station in the Komi ASSR and the Lokosovskiy in the Tyumenskaya oblast. In addition, it is necessary to take measures for an increase in the level of gas use in the Orenburgskaya and Gur'yevskaya oblasts, Tadzhikistan and Uzbekistan.

As a result of the introduction of new trunk oil pipelines the hauling of oil by railroad transportation continues to be reduced. In 1979 the oil pipeline Kalamkas-Shevchenko was put into operation on the peninsula of Mangyshlak and the section Surgut-Perm' of the oil pipeline Surgut-Polotsk. To guarantee the transporting of oil from the regions of West Siberia it is necessary to take measures so that in 1980 the oil pipeline Surgut-Polotsk is put into operation with all the planned oil pumping stations.

One of the main questions for the branch, and especially for West Siberia is the fulfillment of assignments for nonproduction construction. It is necessary to do everything for the timely introduction of each house, kindergarten, hospital and cultural-general facility.

In the fulfillment of the decree of the CPSU Central Committee and the USSR Council of Ministers "On Improvement in the Planning and Intensification of the Effect of the Economic Mechanism on an Improvement in the Efficiency of Production and Quality of Work" and the decisions of the November (1979) Plenum of the CPSU Central Committee all the associations, enterprises and organizations before 1 July 1980 should finally pinpoint the plan of work for 1981 having focused special attention on the reduction in the number of newly started construction sites, concentration of capital investments and material and technical resources at the facilities to be introduced, and reduction in the incomplete construction.

Constant attention is given in the branch to scientific and technical progress--the introduction of modern technological processes, new technical resources and improvement in the organization of work. The economic effect from this in 1979 alone was about 100 million R.

Many highly efficient developments have been made by the VNIIBT [All-Union Scientific Research Institute for Drilling Techniques], SibNIINP [Siberian Scientific Research Institute of the Petroleum Industry], TatNIPIneft' [Tatar Scientific Research and Planning Institute of the Oil Industry], VNIPIgazpererabotka [All-Union Scientific Research and Planning Institute of Gas Refining], VNIISPTneft' [expansion unknown] and other institutes. The activity of the special design office of seismic instrument making in Saratov deserves a high evaluation.

At the same time one should note that a number of leaders of the associations and enterprises, scientific research and planning institutes do not focus proper attention on the development of the technical base of the branch. Precisely for this reason not all the assignments of the national economic plan for the introduction of new equipment and the leading technology and the program of the USSR GKNT [State Committee on Science and Technology] for the solution of the most important scientific and technical problems are fulfilled in the planned periods.

As yet the tasks set for the scientific production associations Soyuztermneft' and Soyuznefteprookhim are being solved on an insufficient level.

There are significant shortcomings in the work of a number of branch scientific research and planning institutes.

The work of the VNII [all-union scientific research institute], the main institute for solving questions of increasing the oil output, the scientific-organizational and guiding activity of the VNIIBT that is responsible for the development of a whole set of scientific problems of perfecting construction of wells deserves definite criticism.

The main task of the scientific research institutes and the design organizations is to concentrate all forces on the solution of the most important branch problems on which the further development of the oil industry of the country depends.

In 1980 all the collectives of the associations, enterprises and organizations of the branch were given large and important tasks and they need to guarantee the precise operation of each service and each production collective.

In the first place the efforts should be concentrated on an increase in the productivity of labor, and achievement of the best final results. And here the main level is all-possible unfolding of socialist competition directed towards the maximum use of reserves. The successful work is mainly decided by the people, therefore their activity needs to be organized such that the labor impulse of the collective is directed towards fulfillment of the specific task with clearly formulated directions of its solution.

In practice there are many examples where the highly efficient work is attained due to the high organization of the entire technological process according to a unified complex contract, in which besides the main production link the activity of different links of related subdivisions is included.

Under conditions of the oil industry the organization of work based on complex contracts in the main production would accelerate the introduction of main funds into operation and increase oil extraction. Here in drilling consideration would be made for the activity of the railway specialists, derrick installers, drillers, pluggers, geophysicists, the brigades for development, building around wells and oil extraction, electricians, workers of the KIP [set of measuring instruments] and automatic machines, UPTO [administration of production-technical servicing] and KO [acid treatment] and other subdivisions, and in oil extraction--brigades for extraction, repair of underground and surface equipment, study of wells, electricians, workers of the KIP and automatic machines, UPTO and KO and other subdivisions with the establishment of the order for stimulating each depending on the degree of participation in obtaining the final result.

The system of planning-evaluating indices for stimulation on the enterprise level for the final result in the branch has been developed and tested in the associations Tatneft', Bashneft' and Nizhnevolzhskneft. Now it is necessary to summarize the first results, and the main--to update them as applied to the brigades for drilling and extraction of oil.

A high degree of organization, production and labor discipline, the efficient use of labor resources, and the formationof stable labor collectives--this is the main direction of the implementation of the economic and social policy of the party, increase in the efficiency of production and education in a communist attitude towards labor. In the decree of the CPSU Central Committee, USSR Council of Ministers and the AUCCTU "On the Further Strengthening of the Labor Discipline and Reduction in Personnel Turnover in the National Economy" this task is considered the most important for the party, soviet, trade union and komsomol organs and economic leaders. In this direction the experience of the operation of the Bashneft' organization deserves to be widespread; in the space of many years, despite the constantly complicated conditions of operating the fields due to their entrance into the late stage of development it has maintained the annual extraction of oil with gas condensate on the level of 40 million T. Here they are continually concerned about the workers, see the contribution of each to the development of the oil industry, and make timely note of the achievements, without leaving unnoticed the omissions in the work as well. And this is done on all levels of control. The social organizations of the association actively direct efforts towards solving the main goal--attainment of a high annual level of oil extraction. Here is evident the positive activity of the leadership of the association, councils of directors, and secretaries of the party and trade union committees of the enterprises.

General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet Comrade L. I. Brezhnev at the December (1977) Plenum of the CPSU Central Committee noted that one of the main reserves for accelerating the economic development of the country is a prudent, efficient use of everything that we have, and everything that the national economy produces.

The Communist Party and the Soviet government allocate enormous financial resources and material and technical resources for the development of the oil industry. Each association has more capital investments than are allocated to many branches of the industry. A saving of only 1% of the capital investments is 65 million R. In this respect it is very important for the decisions on the use of capital investments to be deeply thought out and to correspond to the modern level of technique and technology, for the invested resources to be compensated for in the shortest possible periods, and for the acquired equipment and materials not to wear out and become obsolete in the storehouses.

Inspired by the decisions o. the November (1979)Plenum of the CPSU Central Committee the collective of the association Nizhnevartovskneftegaz, having adopted an additional counter plan in the name of the 110th anniversary of the birth of V. I. Lenin acted as the initiator of socialist competition in the branch for the early fulfillment and overfulfillment of the state plan, and transformation of the final year of the 10th Five-Year Plan into the year of accelerated work. This initiative was supported by the collectives of all the associations, enterprises and organizations of the branch.

On the whole for the branch in 1980 it is planned to extract above the plan 4 million T of oil with gas condensate. This must be attained by means of an increase in the efficient work of the enterprises, use of internal reserves, acceleration of the introduction of new plants, and the broader introduction of new methods for improving oil output.

In drilling thanks to the perfection of technology, timely fulfillment of a whole set of preparatory work, creation of conditions for highly productive work of each drilling brigade and the further reduction in the outlays of time for the construction of wells it has been planned to finish construction of 30 wells in addition to the plan. Increased commitments for the output of products have been adopted by the collectives of the all-union production association Soyuzneftegazpererabotka, Soyuzneftemashremont, and Soyuzneftespetsmaterialy.

The task of all the leaders and each oil worker on the basis of the all-possible use of the production reserves, accelerated introduction of the achievements of science and technology, the scientific organization of labor and control, and the use of the leading experience is to successfully complete 1980 and create a strong base for the development of the oil industry in the 11th Five-Year Plan.

Having been actively included in the work for the fulfillment of the adopted increased socialist commitments in honor of the 110th anniversary of the birth of V. I. Lenin the production collectives already in the first 2 months have yielded above the plan 338,000 T of oil with gas condensate, 150 million m^3 of natural gas. High production indices have been attained by the initiators of the socialist competition in the branch, the collectives of the association Nizhnevartovskneftegaz, as well as the associations Ukrneft', Nizhnevolzhskneft', Gruzneft', Grozneft' and others.

Of the 28 associations 15 have successfully coped with the plan and the socialist commitments for this period. The remaining in the achievement mainly of the planned indices are lagging to a certain extent in the fulfillment of the socialist commitments. These collectives need to direct all efforts on the most rapid elimination of this backwardness.

The oil workers, true to the labor traditions, will direct all efforts knowledge and experience to the achievement of new and high boundaries of the oil industry, further strengthening of the fuel and energy complex of the country, and resource base for the development of the petrochemical and chemical industry and to worthily meet the 26th CPSU Congress.

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FUELS

ELECTRIFICATION AS A MEANS TO REDUCE ENERGY CONSUMPTION

Moscow IZVESTIYA AKADEMII NAUK SSSR--SERIYA EKONOMICHESKAYA in Russian No 2, Mar-Apr 80 pp 78-86

[Article by T. N. Ivanova: "Efficient Use of Energy Resources"]

[Text] The content and nature of electric consumption is revealed in the article on the basis of analyzing the dynamics of electric energy use according to individual production processes and the degree of intensification of electric consumption is determined. Main attention is devoted to determining the reserves and justification of the methods and trends for increasing the effectiveness of utilizing energy resources.

Intelligent and efficient use of natural resources, including fuel, was determined and determines the policy of future development of the USSR and of the other socialist countries. At the same time, the volume of fuel and energy resources used in the national economy of the USSR is increasing continuously. It reached 1,594,300,000 tons of comparison fuel in 1978.[1] The production of fuel resources is the most fund- and labor-consuming sector of industry. The fund consumption of the oil and peat-producing sectors is 3-3.5-fold, while that of the remaining fuel sectors is twofold higher than the average fund consumption of industrial production. A total of 1.5-2 times more labor expenditures per unit product cost is required in the coal-mining industry and in shale mining, while almost three times more are required in the peat-producing industry than the average throughout industry.[2] However, the level of development of modern equipment permits beneficial utilization of approximately 40 percent[3] of the fuel and energy resources during consumption and the losses comprise 60 percent, of which one-third are losses in fuel production and transport and energy production and transmission and two-thirds are losses in use of energy.

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[1] "Narodnoye khozyaystvo SSSR v 1977 godu" [The National Economy of the USSR in 1977], Moscow, "Statistika", 1979, p 44.

[2] Udovenko, V. G., "Mineral'nyye resursy v strukture promyshlennykh kompleksov" [Mineral Resources Within the Structure of Industrial Complexes], Moscow, "Nauka", 1973, pp 108-109.

Solution of the problem has a number of aspects which assume selection of energy-conserving technology of material production, improvement of its structure, improvement of the equipment which produces and consumes energy, improvement of the quality of construction materials, an increase of their heat-insulating properties to save heat and energy and so on.

Electrification opens up enormous opportunities to reduce energy expenditures in the national economy. Scientific and technical progress in the field of energy production contributes to a decrease of specific fuel expenditures. For example, the fuel expenditures per 1 kW·hr of electric power was reduced by a factor of 1.4 during the period 1960-1977. As a result, the consumption of fuel resources for production increased 2.8-fold with a 3.9-fold increase in the volume of electric energy. At the same time the increase of steam and hot water consumption in the national economy of 3.3-fold was accompanied by almost the same increase (3.2-fold) of fuel expenditures to produce them.

However, the reserves for increasing the efficiency of thermoelectric power plants with modern methods of electric energy production are close to exhausted. This is indicated by the decrease of absolute dimensions of saving fuel resources in the electric power engineering of the USSR during the Ninth Five-Year Plan compared to the Eighth, with a simultaneous increase of the absolute growth of electric energy production. A total of 35.3 million tons of comparison fuel was saved in 1970 compared to 1965 by reducing normative expenditures, while 27.7 million tons of comparison fuel were saved in 1975 compared to 1970. The problem of further reduction of specific fuel consumption for electric energy production can be solved with development of new methods of producing it, including nuclear power engineering and the method of MGD [Magnetohydrodynamic] generation of energy. The latter has a generation efficiency of 50-60 percent, unlike the 40-42 percent at thermoelectric power plants.

The greatest amount of energy is lost during consumption. It is here that enormous reserves are found for increasing the saving of energy.

Scientific and technical progress expand the capabilities of creation and improvement of electric receiving equipment and permits essential variation of the traditional technology of energy affecting the object of labor. New electronic technology methods which reduce consumption of useful energy have been developed.

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[3] The calculations show a similar value in the USSR and the United States.

For example, the need for useful energy has been reduced significantly as a result of using new methods of electric heating in machine building, in some sectors of the chemical industry, the paper and pulp, woodworking, light and food industries and the construction materials industry. With the current expenditures of fuel for electric energy production, expenditures of primary fuel and energy resources per unit of produced product are reduced by 40-60 percent in machine building and by 20 percent in the chemical industry with introduction of high-temperature plasma processes. Electrification of low-temperature production processes and the use of new methods of drying and also methods of operation--high-frequency or infrared heating--reduce the expenditures of primary fuel and energy resources in the construction materials industry and machine building by a factor of 2-3 and by a factor of 6-7 in the woodworking industry.

Electrification of thermal processes in metallurgy contributes to a saving of primary fuel and energy resources only in production of nonferrous metals. Calculations show that the essentially new electrometallurgical process--direct recovery of iron from ore with production of electric furnace steel from pilots, i.e., development of non-blast furnace and cokeless ferrous metallurgy--should also lead to a reduction of fuel and energy expenditures compared to the blast furnace process.

Consequently, an increase of the utilization efficiency of fuel and energy resources is not simply replacement of energy carriers (instead of electric power steam), but a search for new electric technologies, principles and methods of electric energy affecting the object of labor, selection of the most progressive equipment, i.e., improvement of the functional and sector structure of energy consumption, which means a change of the ratio of electric energy consumption for lighting, television and radio apparatus, means of communications, motor (stationary and mobile power) and production processes (thermal and chemical), to which heating and hot water supply are conditionally related.

Table 1. Functional Structure of Electric Consumption in Energy, Percent

Processes	1960	1965	1970	1975
Total industry, including:	100	100	100	100
motor processes	66.5	67.0	66.8	66.9
production processes, among which:	25.2	25.4	25.6	26.0
electrothermal	9.9	10.3	11.7	14.2
electrochemical	15.3	15.1	13.9	11.8
lighting	8.3	7.6	7.6	7.1

However, it would be erroneous to estimate the effect of scientific and technical progress on electric consumption of industry only by the rate of variation of the structure of this electric consumption. As can be seen from the given data, redistribution of electric energy among processes occurs rather slowly with a significant variation of the internal structure of the processes themselves (Table 1).

A new stage of electrification has begun since approximately the 1960s when a reduction of electric consumption of individual energy processes and sectors has occurred with an increase of the fraction of electric energy in the fuel-energy balance of industry. Scientific and technical progress in this field is characterized on the one hand by an increase of electric consumption as a result of increasing the level of electrification (as the utilization efficiency of electric power is increased and as the material and technical base of electrification is developed) and, on the other hand, by a reduction of electric consumption as a result of intensification of electric energy use (improvement of the technical parameters and an increase of the productivity of production units, an increase of the efficiency of electric-receiving devices, a reduction of the production cycle, improvement in the use of equipment output and so on). The interaction of the indicated directions of technical progress makes it difficult to estimate the structural changes in electric consumption. Therefore, let us analyze the effect of the factors of scientific and technical progress on variation of the rates of growth of electric consumption of individual power engineering processes.

Among the main factors which determine changes in the functional structure of electric consumption should be named: 1) the increase in the volumes of industrial production, 2) changes in the intrasector structure of industry, 3) electrification of energy processes--expansion of the use of electric energy and 4) intensification of using electric energy--reduction of the specific consumption of electricity.

Electric consumption is formulated due to the effect of quantitative and qualitative factors. The former may include an increase in the volumes of production and the second may include variation of the structure of industrial production, electrification and intensification of energy processes. Improvement of the technology and equipment of electric consumption, by qualitatively transforming industrial production, contributes to variation of the specific electric energy consumption (motor, production and lighting) in sectors and in industry as a whole per unit of produced product, i.e., its electric capacity. The ratio of the effect of these factors also forms the trends of the electric capacity of production.

Analyzing the dependence of the growth rates of electric consumption by individual groups of energy processes (motor, production and lighting) on the factors enumerated above[4] by means of the index method, we arrive at the conclusion that the increase of energy consumption in USSR industry is determined by constant expansion of the volumes of production, formation of a more electricity-consuming structure (by an increase of the specific weight of the sectors with the greatest specific electric energy consumption) and by electrification of the energy production processes and those which service industry. However, the actual growth rates of electric consumption of all energy processes are slowed down in this case. This slowing is to a greater extent the increasing effect of methods of intensification in use of electric energy, i.e., an increase of the efficiency of the electric-consuming equipment.

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[4] The method of this analysis includes the following. Electric consumption of the considered energy process (motor, production and lighting) of an industrial sector or of industry as a whole can be expressed thusly:

According to data of the Seventh, Eighth and Ninth Five-Year Plans (Table 2) calculations show that the degree of the effect of different factors on the

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$$\text{Э}^{d,t,o} = \left(\sum_i y_i^{d,t,o} f_i\right) \cdot V,$$

where V is the volumetric index of the development of a sector (gross production), $y_i^{d,t,o}$ is the specific consumption (electric consumption) of electric energy--motor, production or lighting per unit of gross production of the sectors of industry and f_i is the fraction of the production of a sector in the total industrial production. The effect on the growth rates of electric consumption of each energy process, the rates of development of the sector (the first factor), variation of its structure (second factor) and variation of the specific electric energy consumption of corresponding energy processes per unit product of the sector (the third and fourth factors) can be determined sequentially within a specific period by using the index method. The index of specific electric energy consumption in turn reflects the production and technical changes in the sector and can be expressed as the product of two coefficients K^e and K^i:

$$J y_i^{d,t,o} = K^e K^i,$$

where K^e is the coefficient of the increase of electric consumption as a result of the increase of electrification of a specific energy process (the third factor) and K^i is the coefficient of reducing electric consumption as a result of intensification of the electric consumption process (the fourth factor). These coefficients will reflect the different direction of the effect of scientific and technical progress on the extent of electric consumption.

The coefficient of intensification (K^i) will vary in proportion to the variation of time expended by the unit of energy output of a specific type (an electric motor and electric apparatus) to produce a unit of product. The value of K^e can then by found from the formula given above.

Thus, the index of electric consumption of a specific energy process of the considered sector will be represented by the product of four indices, each of which will reflect the effect of the corresponding factor within a specific time period (for example, within five years). If a very short time period is taken (for example, one year), the annual growth rate of electric consumption can be represented without a large error as the sum of the corresponding growth rates.

rates of electric consumption of individual energy processes of industry vary in a specific direction.

Expansion of the volumes of industrial production contributes to an even greater extent to an increase of electric consumption. A total of 44.9 percent of the increase in volumes of electric energy in motor processes, 42.5 percent in production processes and 73.5 percent in lighting was achieved during the period 1960-1965 as a result of increasing the volumes of gross production. The fraction of this factor in the increase of electric consumption was increased to 55.3 percent in motor processes, to 55 percent in production processes and to 89.2 percent in lighting processes during the Ninth Five-Year Plan (1970-1975).

Table 2. Effect of Individual Factors on Growth Rates of Electric Energy Consumption in USSR Industry*

(1) Процессы, годы	(2) Среднегодовые темпы изменения электропотребления, %				(7) Возможный прирост всего (сумма положительных факторов)	(8) Фактический прирост (сумма всех факторов)
	(3) в результате роста объемов производства	(4) в результате изменения отраслевой структуры	(5) в результате электрификации процесса	(6) в результате интенсификации процесса		
(9) Двигательные процессы						
1960—1965	+8,6 +44.9	+1.65 +8.6	+8.9 +46.5	−7,4 −38.6	+19,15 100	+11,75 61,4
1965—1970	+8.45 49.4	+0.5 +2.9	+8.15 +47,7	−9.4 −55	+17,10 100	+7,7 45
1970—1975	+7,4 +55,3	+0,3 +2.2	+5.7 +42,3	−6.9 −51,5	+13,4 100	+6,5 48.5
(10) Технологические процессы						
1960—1965	+8.6 +42.5	+3.35 +16,5	+8.3 +41,0	−8.55 −42,2	+20,25 100	+11,7 57.8
1965—1970	+8.45 +46.2	+1.25 +6.8	+8,6 +47,0	−10 −54,6	+18,3 100	+8.3 45,4
1970—1975	+7,4 +55,0	+1.0 +7,4	+5.05 +37,6	−6,9 −51,3	+13,45 100	+6.55 48,7
(11) Осветительные процессы						
1960—1965	+8,6 +73.5	+1,2 +10,3	+1,9 +16.2	−2.95 −25.2	11,7 100	8,75 74.8
1965—1970	+8.45 +82,4	+0,6 +5,9	+1,2 +11,7	−3,65 −35,6	10,25 100	6,6 64,4
1970—1975	+7,4 +89,2	+0,5 +6,0	10,4 +4,8	−2,95 −35,5	8,3 100	5,35 64,5

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* The annual growth rates (+) and rates of reduction (-) of electric consumption are shown in the numerator and the fraction of the factors is shown in the denominator.

[Key on following page]

Key (Continued from preceding page):

1. Processes, years
2. Average annual rates of variation of electric consumption, percent
3. As a result of increase in production volumes
4. As a result of variation of sector structure
5. As a result of electrification of a process
6. As a result of intensification of a process
7. Possible total increase (sum of positive factors)
8. Actual increase (sum of all factors)
9. Motor processes
10. Production processes
11. Lighting processes

Gradual slowing of the conversion of the macrostructure of industry reduces the degree of its influence on the increase of electric consumption. The increase of electric energy consumption as a result of intersector structural changes in industry was reduced from 8.6 to 2.2 percent in motor processes, from 16.5 to 7.4 percent in production processes and from 10.3 to 6 percent in lighting processes during the Ninth Five-Year Plan compared to the Seventh Five-Year Plan

Analysis of the data in Table 2 indicates that the method of saving electrical energy are introduced into industrial production more rapidly than the electrification process proceeds. As a result the actual growth of electric consumption in industry comprised 61.4 percent in motor processes, 57.8 percent in production processes and 74.8 percent in lighting processes with respect to the possible consumption (the total of factors which only increase electric consumption) during the Seventh Five-Year Plan. The expansion of using electric-saving technologies during the Ninth Five-year Plan reduced even more the absolute growth compared to the possible consumption to 48.5, 48.7 and 64.5 percent, respectively, for the processes, i.e., intensification of electric consumption compensated for a considerable part of the required increase of electric energy.

An important relationship was determined as a result of calculations between the two directions of scientific and technical progress in industry--electrification and development of intensive methods of using electric energy. A rapid increase of electrification is accompanied by an increase of the degree of the effect of intensification factors with respect to electric consumption. Consequently, electrificaton creates material prerequisites for intensification of electric consumption.

It is obvious from Table 2 that the greatest rates of electrification and intensification of motor and production processes was observed during the Eighth Five-Year Plan. A reduction of the growth rates of electrification during the Ninth Five-Year Plan led to slowing of the process of intensification, which, along with other factors, was caused by variation of the structure of electric production processes.

It should be noted that the efficiency of electric energy depends both on the principles of the effect of energy on the object of labor (thermal, chemical, ion and so on) and on the methods of accomplishing them. The types of thermal (electrothermal) effect of electric energy are especially numerous. Among them can be distinguished high-frequency, infrared, contact, radiation and convection. Electrothermal and electrochemical (electrolysis) technologies now occupy the greatest specific weight in USSR industry. The former is usually less electric consuming and its specific weight is ever increasing, which leads to a reduction of electric consumption of production in combination with other methods of intensification of electric consumption.

The tendency for changes in the structure of electric consumption and variations of electric capacity indicate that the specific weight of progressive electric production processes increases and that the fraction of electrothermal technology in their structure increases. Energy consumption for electrothermal operations increases with a reduction of the electric capacity of motor, production and lighting processes. Consequently, an increase of the utilization efficiency of electric energy is determined to a significant degree by improvement of the internal structure of individual energy processes (Table 3).

The capacity of electric energy to be converted to different forms opens up greater opportunities for intensification of production processes than motor processes, which is indicated by the savings of electric energy achieved in separate energy processes. The conditional saving of electric energy[5] calculated per 1 kW of capacities installed in industry in motor processes comprised 578 kW·hr in 1965, 781 in 1970 and 587 kW·hr in 1975 and that calculated for production processes comprised 1,079, 1,262 and 1,055 kW·hr, respectively.

Table 3. Electric Capacity of Production in USSR Industry, kW·hr/rub, Gross Production

Processes	1960	1965	1970	1975
Total industry, including:	1.31	1.46	1.36	1.27
motor processes	0.87	0.98	0.91	0.85
production processes	0.33	0.37	0.35	0.33
of which:				
electrothermal	0.13	0.15	0.16	0.18
electrochemical	0.20	0.22	0.19	0.15
lighting	0.11	0.11	0.10	0.09

Variation of the trends of the effect of electrification and intensification of electric energy use on the growth of electric consumption (an increase of it during the Eighth Five-Year Plan and a decrease during the Ninth Five-

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[5] Calculated from data of Table 2. The conditional saving of electric power is the difference in absolute value between the possible and actual increase in separate processes, related to corresponding capacities.

Year Plan compared to the Seventh Five-Year Plan) provides the basis to consider in more detail the nature of action of these trends of technical progress in individual sectors of industry.[6] Analysis of the data indicates that a reduction of electric capacity is not always accompanied by slowing of electrification and, on the other hand, high growth rates of electric capacity do not indicate acceleration of this process. For example, an increase of the capacity of motor processes is observed in the fuel, ferrous metallurgy, timber, woodworking and pulp and paper industries. In this case the rates of electrification of these processes is lower than in the sectors of the chemical and petrochemical industry, machine building and construction materials industry, in which the trend toward a reduction of capacity is constant (Table 4). The latter sectors are characterized by more intensive use of motor energy. Intensification in the use of motor energy is related not only to improvement of the specifications of equipment and to correct utilization of its capacities, but also to introduction of new production processes (thermal, electrochemical and electrophysical instead of mechanical), which increases the output of production energy and reduces motor energy. The latter trend of technical improvement of industry is more promising since the reserves for increasing the effectiveness of traditional equipment have been exhausted to a considerable degree.

The growth of electrification of thermal and chemical technology an introduction of new electric production methods contributes to an increase of production capacity. Intensification of the use of electric energy in production processes has more diverse forms compared to nonelectric technology. This is automation of production process control in all sectors of industry, the use of electromagnetic mixing devices to accelerate the production cycle in metallurgy and chemistry and the introduction of high-speed and continuous heating, electron-beam installations in machine building, the crude and pulp and paper industry and the construction materials industry.

Electric energy is utilized most intensively in production processes of the chemical industry and machine building, which contributes to a reduction of the capacity of these processes at significant rates of electrification.

At the same time the data calculated for the Eighth and Ninth Five-Year Plans rather clearly convinced one that the modern growth of production capacity in motor and production operations is related in some sectors not so much to development of electrification as to deterioration of the process of intensification of using electric energy. Production capacity calculated for production electric energy increased during the Ninth Five-Year Plan compared to the Eighth Five-Year Plan when the rates of electrification were reduced in sectors of the fuel industry, ferrous metallurgy, the complex of the timber industry and the construction materials industry. In

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[6] The sector is conditionally regarded in the given case as the unified technological community; therefore the effect of structural changes within sectors increases or reduces the effect of the electrification factor. For example, one can say that the increase in the fraction of electric steel is a process of electrification of steel smelting and so on.

Table 4. Effect of Factors on Variation of Production Capacity of Main Sectors of USSR Industry During the Period 1965-1975

(1) [illegible]	(2) [illegible]											
	(3) [illegible]						(10) [illegible]					
	(4) [illegible]			(5) [illegible]			[illegible]			[illegible]		
		(6) [illegible]			[illegible]			[illegible]			[illegible]	
	(7)	(8) [illegible]	(9) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Топливная (11)	1,13	1,37	0,82	1,02	1,33	0,77	1,00	2,40	0,42	1,50	1,50	—
Черная металлургия (12)	1,10	1,63	0,67	1,05	1,40	0,75	1,03	1,53	0,67	1,08	1,28	0,84
Химическая и нефтехимическая (13)	0,90	1,54	0,59	0,88	1,44	0,61	0,97	2,10	0,46	0,79	1,20	0,66
Машиностроение и металлообработка (14)	0,76	1,46	0,52	0,84	1,43	0,59	0,83	1,53	0,54	0,83	1,48	0,56
Лесная, деревообрабатывающая, целлюлозно-бумажная (15)	1,04	1,42	0,73	1,06	1,38	0,77	1,0	2,0	0,5	1,5	1,5	—
Промышленность строительных материалов (16)	0,94	1,58	0,60	0,93	1,39	0,67	1,0	1,67	0,6	1,17	1,33	0,88
Легкая (17)	0,82	1,42	0,58	1,05	1,35	0,78	2,0	3,1	0,64	1,0	1,03	0,97
Пищевая (18)	0,8	1,13	0,71	1,0	1,27	0,79	1,67	1,98	0,85	1,0	1,1	0,91

Key:

1. Sectors of industry
2. Change of capacity, calculated by
3. Motor electric energy
4. 1970 to 1965
5. 1975 to 1970
6. Including due to
7. Total
8. Electrification
9. Intensification of using electric energy
10. Production electric energy
11. Fuel
12. Ferrous metallurgy
13. Chemical and petrochemical
14. Machine building and metalworking
15. Timber, wood-processing and pulp and paper
16. Construction materials industry
17. Light
18. Food

like fashion, deterioration of the coefficient of intensification in the use of motor electric energy during the Ninth Five-Year Plan in light industry led to an increase of production capacity in this process even with decreasing rates of electrification compared to the Eighth Five-Year Plan. It is obvious that production reserves directed toward intensification of electric energy use are still not being adequately utilized in these sectors.

Electrification of industrial production and intensification of the use of energy are determined for the greater part by the rate of propagation of technical progress and the rate of restoration of production equipment. Solution of the problem of accelerating technical progress is related to an increase of the output of new, progressive types of equipment.

One of the main reasons for the slowing of the intensification process in the use of electric energy during the Ninth Five-Year Plan compared to the Eighth Five-Year Plan, which led to some increase of the actual growth of electric consumption, is a reduction of the specific weight of progressive types in production of electric equipment. For example, more than 26 percent of electric energy in industry is consumed by production apparatus, mainly electric furnaces. The most progressive type among them is induction furnaces. However, the specific weight of induction furnaces in the total output of electric furnaces decreased in 1970 compared to 1965.

As many economists feel, overconsumption of motor electric energy (which comprises 67 percent of the electric energy consumed by energy) is for the most part the result of lack of conformity in the capacity of the electric motors of industrial equipment to the work performed. Production of machine tools with excess technical capabilities has achieved wide distribution. This discrepancy is reflected in a reduction of the rates of intensification of electric consumption especially during the past few years, since the most important trends of technical progress (mechanization of manual labor, development of accelerated rates of machine building, the instrument industry and so on) require a significant increase of primarily miniature electric motors. An increase of the specific weight of these motors in their general stock is one of the main methods of intensifying the use of motor electric energy.

Incomplete realization of the reserves for saving electric energy led at the end of the Ninth Five-Year Plan to some deterioration of the coefficient of intensification in use of production and motor electric energy, i.e., to a slowing of the decrease of electric energy of industrial production.

This slowdown in turn contributed to deterioration of the saving of electric energy during individual energy processes and of the total volume of conditional saving of electric energy in industry during the Ninth Five-Year Plan compared to the Eighth Five-Year Plan. Calculated for comparison fuel, the saving of electric energy comprised one million tons of comparison fuel in USSR industry in 1965 compared to 1960, 71.2 million tons in 1970 compared to 1965 and only 70 million tons in 1975 compared to 1970. Technical progress in the field of electric energy production which contributes to a reduction of the specific fuel expenditures per 1 kW·hr and development of methods of economical use of electric energy lead to a reduction of the total specific values of the fuel and energy resources expended for electrification: 449 tons of comparison fuel was expended in 1975 per 1,000 rubles of gross product of industry compared to 628 tons in 1960.

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'MINELESS' COAL PRODUCTION METHOD DESCRIBED

Kiev UGOL' UKRAINY in Russian No 2, Feb 80 p 8

[Article by Dr Tech Sci A. N. Zorin, Ukrainian SSR Academy of Sciences Institute of Geotechnical Mechanics]

[Text] Intensive coal mining is leading to an increase in the depth of mining operations, which is accompanied by certain difficulties: Rock pressure, presence of gas, and temperature rise, and the quantity and intensity of unexpected blow-outs of coal, rock, and gas grow. Moreover the need for excavating out thin beds rises. It should be noted that mine methods for extracting coal have an unfavorable effect upon the environment. As an example almost 500 hectares of land must be reserved each year for waste rock in the Donets Basin (1). The existing coal mining processes are effective only to a certain depth, and they do not solve the problem of intensive coal extraction in complex mining conditions and at great depths.

Considering the growing demand for coal, the need for seeking fundamentally new mining techniques is obvious. Mineless extraction may be based on geotechnological methods presupposing conversion of minerals into a movable state where they lie, and their extraction to the surface by wells (2). Conversion of coal into a movable state may be achieved by dissolution, by hydrogenation, and by reduction of its rigidity, methods which have been worked out well for surface applications (3, 4).

The fundamental principles of mineless coal extraction are:

1) It would be suitable to employ two ways to convert coal, where it occurs, into a movable state--by physicomechanical pulverization by ultrasound, by a drill bit, by gas under pressure, and by dissolution of the coal by liquids;

2) control of the whole breakdown (or dissolution) process, and its monitoring;

3) development of the industrial processes, coupled with mandatory solution of problems associated with transporting the extracted products and controlling the state of the mined space.

Laboratory research was conducted to study the possibilities of using ultrasound to break down coal, and to study control of this process. Coal was sampled for the experiments from the Mine imeni Skochinskiy in Smolyaninovskiy Bed h_7 at a depth of 1,200 meters. Samples with 50 × 50 × 50 mm dimensions were subjected to single-axial and double-axial stress. The force exerted was 30-90 percent of the coal's strength as measured with single-axis compression. Some of the coal cubes were in concrete blocks made from brand 400 cement, which made the stresses upon the sample resemble those of natural conditions more closely. A load of 250 kg/cm^2--that is, one corresponding to a depth of 1 km--was applied to the blocks. Then the samples were subjected to ultrasound. A 400 watt UZDN disperser capable of 15, 22, and 35 kHz frequencies was used as the ultrasonic oscillator. The quantity of samples required was determined for a coefficient of variation of 30 percent and a dependability coefficient of 90 percent.

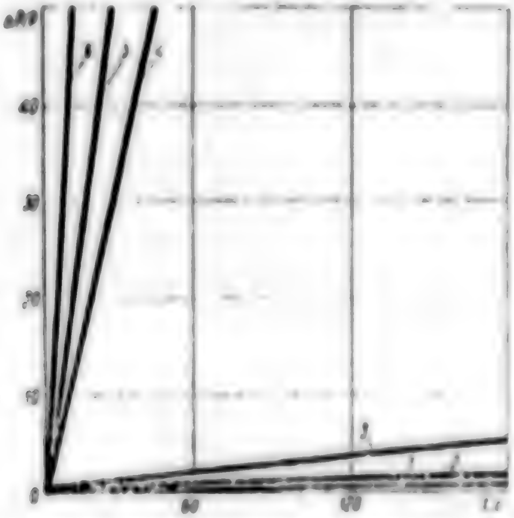

Figure 1. Intensity of Coal Breakdown in Response to Different Loads: *1* and *2*--44 kg/cm^2; *3*--49; *4*--62; *5*--98; *6*--125 kg/cm^2; *P*--initial sample weight, gm; ΔP--change in sample weight during experiments, gm; *P*--sample breakdown time, sec

It was established that as the frequency decreases, coal breaks down more intensively (the greatest intensity was observed at 15 kHz). As the stresses increase, the intensity of coal breakdown rises abruptly, and at loads that are from eight-tenths to nine-tenths of the breakdown loads, breakdown intensity is two to three orders of magnitude greater than that of unstressed samples (Figure 1).

Gas sorbed by coal is known to promote reduction of coal rigidity. Experimental investigation of stressed coal saturated by carbon dioxide and unsaturated coal showed that in the former case the intensity of breakdown increases significantly, with the coal breaking down into finer fractions; the same is observed with coal blow-outs. Obviously ultrasound may be used as a means for controlled coal breakdown in natural beds, where it is present in a highly stressed state and it is saturated by gas.

All of this made it possible to propose a mineless method of coal extraction, the essence of which is as follows. A network of wells is drilled into the bed from the surface, the distance between wells being equal to the size of the area to be mined. The wells are lined with sealed tubes, and the well heads are outfitted with valves; then liquified gas readily adsorbed by coal, for example carbon dioxide, is pumped in. The quantity of gas is determined from the parameters of the bed being worked. Gas pressure is measured in wells adjacent to the area presently being worked and wells in previously worked areas in order to monitor the blow-out hazard. After part of the bed is brought to the verge of blow-out, blow-out of the coal is initiated by a sharp drop in pressure through the well valves. The cavity formed in the bed as a result of the blow-out is filled through the spent wells with a self-hardening plug in order to keep gas from leaking out while extracting coal from areas of the bed adjacent to the worked areas; after this the extraction process is moved to the next area.

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IMPROVEMENTS IN KAZAKH FUEL INDUSTRY SUGGESTED

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 1, Jan 80 pp 26-30

[Article by O. Mul'kibayev, Director, Fuel Industry Sector, Kazakh SSR Communist Party Central Committee: "Make Fuller Use of the Reserves of Fuel Industry"]

[Text] In the last few years our republic has made major advances in developing fuel and energy sectors. In national division of labor today, the Kazakh SSR is credited with 15 percent of the coal mining volume and sizeable volumes of electric energy production and petroleum and gas extraction. Kazakhstan is richest in coal reserves: More than 400 deposits containing reserves of about 190 billion tons have been discovered within its territory.

As we know, the foundation for increasing the country's energy potential predominantly through hydroelectric power, atomic fuel, and cheap coal are being laid in the 10th Five-Year Plan. In addition to raising the effectiveness with which the existing capital of the coal enterprises is being used, we have assumed a course toward creating high-capacity fuel and energy complexes situated at open-cut mines in areas containing large reserves of coal. One of these is the Ekibastuz Fuel and Energy Complex, which is presently being created out of the resources of the Ekibastuz and Maykyubenskiy coal basins. There are plans for raising coal extraction in this region to 170 million tons per year, and for building five electric power plants with a total output capacity of 20 million kw. These plants will use cheap coal to produce 220 billion kw·hr of electric power each year. Of this amount, 100 billion kw·hr will be consumed by Kazakhstan itself, 40 billion will be transmitted to enterprises in the country's center, and 80 billion kw·hr will support the industrial needs of the Urals, Central Asia, and West Siberia.

Implementing party and government decisions associated with satisfying the national economy's need for fuel most completely, the collectives of Kazakhstan's coal enterprises achieved certain successes in the last few years. In 1978 the republic mined 103.4 million tons of coal, or 14.3 percent of the national volume, as opposed to 61.5 million tons and 9.9 percent in 1970.

During the 9th Five-Year Plan and in 3 years of the 10th Five-Year Plan Kazakhstan was responsible for 42 percent of the total increment in the country's coal extraction volume, to include 57 percent in relation to subterranean mining and 40 percent in relation to open-cut mining. The Karaganda and Ekibastuz basins have the lead in the sector in relation to a number of the most important technical-economic indicators. Just in the present five-year plan reconstruction of existing enterprises and construction of new ones have raised the productive capacities of fuel extraction by more than 15 million tons, or by 15.6 percent, to include almost by 2.5 million tons in the mines and by 12.7 million tons in open pits.

Today all of Karaganda's mines are furnished with modern mechanized complexes and narrow-grab combines, while the open-cut mines of Ekibastuz are outfitted with powerful rotary and single-bucket excavators, and the latest transportation resources. Automation and telemechanics have come to the aid of the miners. Progressive production flow patterns for exposing and processing coal beds have enjoyed universal spread in both basins. As an example a procedure for mining thin and flammable beds and for (otrabotka stolbami po padeniyu) has been developed and introduced in the Karaganda basin, and application of new methods for manipulating cavein-resistant roofing is broadening. For the first time in open-cut mining a cyclic flowline coal mining process using high-power rotary excavators was introduced on a broad scale at the open pits of the Ekibastuzugol' Association.

The activity and the creative initiative of the miners are constantly growing. The Karaganda basin has become the cradle of many patriotic initiatives. This was the birthplace of the movement of the "thousanders," who fought for highly productive use of mining equipment. Today 58 of the 138 longwalls of Karaganda mines are operating with such a load. It is noteworthy that this valuable initiative has transformed into a new movement. Now 15 collectives representing different mining areas are fighting to attain a load of 500,000 tons of coal per year and more per longwall. The fight for higher coal mining effectiveness is presently being won by collectives of the Kostenko, Gorbachev, Severnaya, 50-letiye Oktyabr'skoy revolyutsii, and Dolinskaya mines.

Coal miners of Ekibastuz are competing for the highest productivity of earth-moving equipment, and 55 excavator and locomotive teams have exceeded planned labor productivity for stripping and terracing operations.

In addition to other industrial complexes of national significance, the youngest complex--the Mangyshlak Territorial Production Complex--has been developing successfully in recent years in the Kazakh SSR. Its creation has motivated significant economic development of this region. Petroleum and gas extraction is now becoming the basis for creating a major production cycle for the integrated utilization of gas refining products.

Kazakhstan experienced its swiftest growth in petroleum extraction during the Eighth and Ninth five-year plans. During this period petroleum extraction in the republic grew from 2 million tons to 23.7 million tons per year, or by almost 12 times. It should be noted in this case that Mangyshlak contributes about 80 percent to the republic's total extraction volume.

The present status of petroleum extraction is typified by the use of highly productive equipment, progressive processes, automated and mechanized resources, use of chemical reagents to work the beds, and so on.

As in other areas of fuel industry, a certain amount of production experience has been accumulated in petroleum extraction. The collective of the Embaneft' Association has already been working stably for several years, and each year it is able to fulfill its plan and satisfy its socialist pledges. The Mangyshlakneft' Production Association has also been successful.

However, the rate of petroleum extraction dropped somewhat in the 10th Five-Year Plan, and today its level is about 18.0 million tons--much less than foreseen by the five-year plan. But new deposits have been recently discovered in the republic, to include Karamandybas, Vostochnyy Zhetybay, Severorakushechnoye, Karazhanbas, and Kalamkas on Buzachi Peninsula. The last two are especially promising.

We can see from this that Kazakhstan possesses great potentials for increasing the volume of coal and petroleum it extracts. Unfortunately, however, these potentials are far from fully utilized.

There are many unutilized production reserves in these sectors of the national economy, and the level of administration is behind today's requirements. Thus the coal industry enterprises fell short of the 1978 plan by about 1.6 million tons of coal. In 1979 they fell short of the initially set plan by about 7.5 million tons of coking coal and coal intended for power production.

An especially grave situation has evolved in the Karagandaugol' Association. In 1978 11 of the mines, and the association as a whole, were unable to fulfill the coal mining plan, and the production volume was permitted to decrease in comparison with previous years of the five-year plan. Nor did the state of affairs improve in 1979. As before, many of the mines were unable to fulfill the state plan in relation to the coal mining volume and other important technical-economic indicators.

What were the causes? First of all there were serious mistakes made in production control and organization, preparatory mining operations were behind, reserves were poorly utilized, and a number of other shortcomings existed.

The basin has been unable to fulfill its preparatory mining operations plan for a long time. In the amount of time that has passed in the 10th Five-Year Plan, the mines have been short about 100 km in their principal and auxiliary tunneling operations. As a result 17 of the mines are not prepared adequately today for mineral extraction, and 10 mines have not had their working horizons prepared. A 1.2 million ton discrepancy has appeared in the production plan.

The rate of equipment breakdown and the incidence of defects in the drifts are high in the mines, the schedules for installing and dismantling mechanized complexes are being violated, long period of idleness occur at installed longwalls, and mechanisms are not repaired quickly and well. On the whole the association's losses of working time due to idleness and mishaps associated with just the longwalls outfitted with mechanized complexes exceed 25 percent.

Serious errors have also been made in the use of personnel. High turnover of miners is permitted, and not everything is going well with production and labor discipline.

Adoption of a 30-hour work week by the miners with absolutely no preparations at all had a negative effect upon the rhythmicity of the work of the enterprises as well. Despite a general increase in the number of laborers for the association as a whole, totaling 3,000 persons, recent innovations in labor organization have resulted in a 24 percent reduction in cutters, a decrease in output per worker, and growth in nonproductive losses of working time at the extraction and preparatory faces. Owing to this the need for calling people in on their days off and for establishing repair shifts has risen, which is having an unfavorable effect on the psychological climate within the collectives, and on the maintenance and use of drifts, equipment, and mechanisms.

Insufficient attention on the part of the USSR Ministry of Coal Industry toward long-range development of the basin's enterprises and inadequate allocation of materials and equipment are having a noticeable influence upon mining operations.

Nor are the existing possibilities being utilized in the Ekibastuz basin. The 1979 plan for the association's coal extraction volume was only 92 percent completed, not even counting the correction factors. Work at the strip mines is poorly organized. The stripping plan was 95 percent completed, which corresponds to about 5.0 million m^3 of stripped material that has not been removed, and the total quantity of rock that has not been conveyed to the dumps since the deposit was first put into operation has now reached 80 million m^3. The breakdown rate of earth-moving equipment is high and labor organization is low in operating open pits and those being uncovered.

Capital construction is proceeding unsatisfactorily. Because of inadequacies in the construction and installation capacities of the Ekibastuzshakhtostroy Combine, in 1977-1978 only 52 percent of the required funds were assimilated, and in 1979 the plan for construction and installation was set 11 million rubles lower. Even the established plans are not being met in this case. Funds are only 60-70 percent assimilated. Things are especially poor with the construction of housing and of social and cultural facilities. As a result there is a housing shortage in the basin of about 200,000 m^2. Naturally, this in turn is making it difficult to provide enough laborers, engineers, and technicians to the open pits and the construction organizations in the basin.

Systematic failure of the USSR Ministry of Railways to deliver coal cars is causing great difficulties in the work of operating open pits. Just last year alone the railroaders were short by 70,000 cars. For this reason the national economy failed to receive about 50 million tons of coal.

As was noted above, the level of petroleum extraction has been dropping in recent years. This is associated basically with nonrhythmic work of the Mangyshlakneft' Association. The collective completed its petroleum extraction plan by 94.3 percent in 1976, by 92 percent in 1977, and by 97.5 percent in 1978. The collective also did poor work in 1979.

Of course, there are a number of objective reasons for this: the complex geological structure of the petroleum-bearing horizons, their low productivity in comparison with the planned indicators, intense flooding, salt deposition in a number of deposits, and others. In addition, however, the association does make a practice of crash work campaigns, and it suffers internal problems.

As an example the level of organizational work is low, and violations of production and labor discipline are tolerated. The equipment breakdown rate is high. The operational reserves of the wells are not being utilized adequately on the oilfields. There are cases of long periods of idleness and reduction of well delivery rates due to violations of production conditions.

Important measures such as preparing the bottom hole zones of the wells, placing salt deposits under control, and pumping water into productive horizons are not being completed to their full extent. Just in 1979 alone the association as a whole failed its plan for pumping in cold water by over 2 million m^3, and that for hot water by 9 million m^3. More than half of the heating furnaces intended for hot water pumping operations are not operating for various reasons. There are serious shortcomings in the organization of repairs on producing wells and injection wells. Each day more than 300 wells stand idle due to an insufficient number of work teams and their understaffing in anticipation of underground repairs and overhauls. Repairs are often poor, and they are made with great losses of working time. Because of various organizational shortcomings the nonproductive losses of working time in the association as a whole are more than 50,000 hours per year just in the petroleum extraction and well drilling processes alone.

The level of labor organization is low in drilling operations. The well drilling plan for last year was only 94 percent completed, being short by 53,000 linear meters. The planned capital construction volume is not being completed. The plan for construction and installation at facilities of the petroleum deposits on Buzachi Peninsula has been only 95 percent completed--about 6 million rubles have not been assimilated. There are significant delays in the laying of a petroleum pipeline, and in the construction of dikes, petroleum storage tanks, and pilot facilities at the Karazhanbas deposit.

An analysis would show that there are serious shortcomings in the activities of fuel industry enterprises. The republic is well aware of them, and concrete steps are being taken. However, if we are to normalize the work of the coal and petroleum sectors, union-level organs would also have to devote a certain amount of attention. As an example the amount of capital investments allocated for maintenance of existing output capacities would have to be increased in the Karaganda basin. But rather than increasing the allocations, the USSR Ministry of Coal Industry on the contrary reduces them constantly from one year to the next. Thus in 3 years of the five-year plan the unit capital investments to maintain the output capacities of the mines were 9 percent less than in 1975, while investments into construction and installation were 19 percent less; moreover, last year the amount allocated for these purposes was 9.7 million rubles less than foreseen by the five-year plan.

The association's enterprises are not receiving enough equipment, materials, and spare parts. Since the beginning of the five-year plan the association's requirements have been undersatisfied by 46 mechanized complexes, 99 breaking and tunneling combines, 779 belt and rake conveyors, over 40,000 tons of metallic props, 34 million rubles worth of spare parts, and many other materials and equipment. In this case not only are its orders being left unsatisfied, but also the equipment and materials obtained with allocated funds are not being delivered. During the indicated period the association failed to receive the following amounts of equipment obtained with allocated funds: seven mechanized complexes, 6 extracting combines, 49 rake conveyors, 77 local airing fans, 7,300 tons of metallic props, 215,000 m^3 of timber, 175 km of scraper chains, 235,000 rubles worth of spare parts, and so on.

The USSR Ministry of Coal Industry must face resolution of issues associated with housing construction in the basin. We cannot drag our heels in this. After all, right now according to the waiting lists we need 1.5 million m^2 of housing space to relocate miner's families from overcrowded and dilapidated housing.

The basin's development in the long-term future elicits special anxiety. By the end of the current five-year plan coal extraction will attain 49 million tons in the basin. At the same time six mines with a total productivity of 7 million tons of coal per year will use up their reserves and close by 1995 (Maykudukskaya, Severnaya, Toparskaya, Dubovskaya, Shakhanskaya, and Stepnaya). Moreover because the Kostenko, Mikhaylovskaya, and Kirovskaya mines have exhausted some of their beds, their overall output capacity has dropped by 3.2 million tons. The total volume of output capacities that will go out of production in the future will be more than 10 million tons.

Thus we would be able to maintain the attained coal extraction level in the future on the condition that in the 11th and 12th five-year plans we rebuild and combine the Kalinin and Abayskaya mines and the Sokurskaya and Saranskaya mines, and if we build the new Saranskaya-Glubokaya mine, which would have a capacity of 6 million tons of coal per year, in integration with a concentration plant.

A disproportion has also evolved in Karaganda basin between extraction and enrichment of coking coal. As a result of this, just in 1978 alone 13 million tons of such coal were not utilized for power production. The planned commissioning of the Vostochnaya Concentration Plant, which will have an output capacity of 6 million tons, will not solve this problem completely. Hence we must begin building a new concentration plant in the very near future, one with a processing capacity of not less than 6 million tons of coal per year.

As was noted above, the assignments for creating the fuel base for the power complex in the Ekibastuz basin are not being met. Since construction started, builders have fallen short of the plan by over 40 million rubles in capital investments and 15.0 million rubles in construction and installation operations. The state of affairs demands accelerated creation of the production base of the Ekibastuzshakhtostroy Combine, and a dramatic rise in the rate of housing construction. The USSR Ministry of Coal Industry, the USSR Gosplan, and republic organizations must attentively examine these problems and determine the ways to solve them the fastest.

It would be pertinent to raise the issue of coal industry development in the republic in the longer-range future.

According to estimates made by the Kazakh SSR Gosplan, by as early as 1985-2000 the republic will experience a deficit of from 3 to 79 million tons of comparison fuel in its fuel balance. In this connection we must encourage placement of new coal deposits into the economic turnover.

The most promising of these is the Turgay lignite basin, just the best-explored deposits of which could provide 90 million tons of coal per year. It would be important to note that the coal mined here and the electric power produced on its basis would not require additional outlays for conveying the coal to its places of consumption.

If we are to place the open pits of the Turgay basin into operation in time, we will have to begin developing them as early as at the beginning of the 12th Five-Year Plan.

There is also a great deal of interest in developing the large Nizhneiliyskiy deposit in Alma-Atinskaya Oblast to provide fuel for power production in southern Kazakhstan and in republics of Central Asia.

We need to examine the issue of developing the Yubileynoye deposit in Semipalatinskaya Oblast, and a number of others.

In the republic's petroleum industry sector, if we are to maintain the achieved extraction level and improve the condition of existing deposits, we would first of all have to resolve the issue of introducing effective ways to raise the petroleum yields of the beds, and to place intense salt formation, paraffin deposition, and sand behavior under control. Moreover an acute need has now arisen for providing petroleum refining and drilling enterprises with highly productive hot water pumping devices, highly productive drilling rigs, special equipment, transportation to carry heavy and large items of freight, chemical reagents, high-pressure hydrogen sulfide-resistant equipment, and the necessary materials.

One of the principal tasks facing the petroleum sector is that of placing the new Kalamkas and Karazhanbas deposits on Buzachi Peninsula into operation. Steps are being taken here to accelerate construction of a number of facilities associated with development of these deposits. But the rate of construction of these facilities, and of preparation of the high-priority areas of the deposits, the settlement for on-duty personnel, and the production base is still low.

The USSR Ministry of Petroleum Industry and the republic's construction organizations must turn special attention to these facilities so as to not only take up the slack more quickly but also to significantly raise the level of petroleum extraction in this region.

Solving the problems of creating a fuel and energy base for the national economy, the republic's party and business organs are devoting a great deal of attention to economizing on the existing fuel and energy resources. The letter of the CPSU Central Committee and USSR Council of Ministers "On Intensifying the Work of Economizing on Fuel and Energy Resources," addressed to party, soviet, business, trade union, and Komsomol organizations, was discussed by all party organizations and labor collectives, special measures have been developed to reduce consumption of energy resources, and energy economization assignments have been set.

Complying with these requirements, many of the republic's enterprises have introduced new highly economical production processes and equipment, they have modernized their power plants, they have improved their electric and thermal power supply circuits and lighting systems, and they have established the conditions for sensible use of steam, compressed air, and cold and hot water.

Efforts at improving the use of secondary energy resources and at preventing fuel losses during extraction, transportation, and storage have been intensified. Thus just in 9 months of 1979 ferrous metallurgy enterprises produced 20 percent more thermal energy than in the corresponding period of 1978 by making more-sensible use of waste-heat boilers and other devices. By improving production patterns associated with exposing and working coal beds and by improving fuel quality forecasts the Karagandaugol' and Ekibastuzugol' associations have reduced operational losses correspondingly by 2 and 1.4 percent, which made it possible to increase the extracted reserves by more than 1 million tons.

Under the guidance of the party organizations the enterprises have intensified their efforts aimed at completing the plans and satisfying the socialist pledges for economization of raw materials, materials, fuel, and electric energy. Issues associated with economy and thrift are being illuminated to a greater extent in the press, and on radio and television.

As a result of organizational and political work the republic saved about 40,000 tons of comparison fuel, more than 560,000 gigacalories of thermal energy, and other energy resources in the republic in 9 months of the last year.

At the same time not all enterprises are operating at the required level. Certain of the republic's ministries and departments have still not achieved unqualified fulfillment of economy assignments, and they are condoning excessive consumption.

The Communist Party and the Soviet government devote tremendous attention to creating a high-capacity fuel and energy base for the country. Comrade L. I. Brezhnev devoted a significant part of his speech to the November (1979) CPSU Central Committee Plenum to this important national economic problem. In the last few years the CPSU Central Committee and the USSR Council of Ministers adopted a number of important documents making up a purposeful program of preferential development of fuel industry. A meeting held at the end of October 1979 in the CPSU Central Committee with the participation of workers of the country's fuel industry attests to the party's persistent attention to this issue as well. We must do everything to see that the collectives of the petroleum and gas extracting enterprises would successfully complete the great tasks they face in supporting the national economy's fuel demand. We must make sure that there would be no lagging enterprises in the sectors.

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FUELS

REVIEW OF THE CONDITION OF BUKHTA IL'ICHA OIL FIELDS

Baku VYSHKA in Russian 9 Apr 80 p 1

[Article by M. Pleskachevskiy, correspondent of Azerinform: "Bukhta Il'icha Today"]

[Text] A feature of today's appearance of Bukhta Il'icha is the absence of drilling derricks on the fields. They have been replaced by the so-called eclipses, and then even those were removed. Now the wells are being repaired with the help of self-propelled aggregates "Bakinets" and "AzINMash-37A" that have made it possible to save many thousands of tons of metal. The field landscape has also become more attractive--the pumping jacks have been painted bright colors, the tanks are shot with silver, here and there there are green shrubs and flowers.

The external appearance of the field area to a great deal also determines the efficiency of production. During its entire history Bukhta Il'icha has had a reputation for the fact that it kept pace with scientific and technical progress. Now, when for objective reasons associated with "aging" of the fields their output is decreasing the oil workers are seeking additional reserves for stabilization of oil extraction. One of the significant reserves is perfection of the underground repair service. This is why the initiative of the foreman Guseynal Aliyev, marked by the state prize of the republic was evaluated so highly and widely supported--repair wells rapidly, with a guarantee of high quality. Of the 48 brigades who followed the example of G. Aliyev, many have already fulfilled the assignments of the 10th Five-Year Plan on the Leninst labor watch. The quality of repair guaranteed an increase in the inter-repair period of well operation, they stand less and yield more fuel. The repairmen last year revived six inactive wells. This year it is planned to restore 10 wells by cutting and tunneling second shafts. Four of them have already been restored; they yield 5-7 tons of oil each per day.

The specialists and innovators of Bukhta Il'icha relentlessly perfect the production processes. They are one of the first in Baku to start automating the oil extraction processes. Now from the control point the operators make measurements, take dynamometric readings of the wells that are scattered over a large territory. To control corrosion so-called inhibitors are used very effectively. The oil collectors suffered especially from corrosion, the pipes in them were replaced every month. Now in the collectors pipes are used with polyethylene lining that will last years. In 10 wells gas anchors have been used and each of them has increased its output. About 30 wells have been switched to periodic operation with a large economic effect. The same number of wells operate with "double traction," that is, two productive oil beds are used simultaneously. Seventeen wells have been treated with foam cement solution in order to limit the water influx. A block-cluster pumping station has been put into operation to pump waste water into the beds. Its purpose is to control environmental pollution. All of these are characteristics of the new, features of today.

The shop of scientific and production work in which two candidates of technical sciences Ali Daizade and Aleksey Prok, and dozens of licensed engineers work has become the great moving force in the competition and development of production. Never before has Bukhta Il'icha been so saturated with specialists, never before has there been such a high cultural-technical level of the labor collective. And it continues to grow. Of the 2,500 people working in the NGDU imeni 26 bakinskikh komissarov [Oil and Gas Extracting Administration] about 2,000 have been engaged in different types of study, in the network of party-political education, in economic schools, in schools of working young people, and in the technical schools and higher institutes of learning.

In a friendly coordinated collective the oil workers grow and are educated in the famous traditions of the Baku proletariat. It is necessary to name the veterans whose production service started in 1920 when Soviet power came to Azerbaijan. There are seven of them: operator for oil extraction of the first field Ali Mamedov, operators of field No 2 Magerram Meshadi Ibad ogly and Misak Kasparyan, operatory of the third field Mkrtych Khachaturov, machine operator of the gas compressor station Nikolay Volodin, motor mechanic of the shop of special equipment Teyyub Aslanov, and machine operator of the pumping station Grigoriy Osipov.

One can envy these people--for 60 years they have continuously been in the working system, cheerful and buoyant. This is the living history of Bukhta Il'icha. Preparing for the Lenin anniversary they relate the filling in of Bukhta, the attention that Vladimir Il'ich showed towards oil Baku, and towards the people of Baku.

"Gyul'bala Aliyev has worked at the field 70 years and we will not miss him," the veterans joke.

The middle generation of oil workers can also be proud of the working celebrities. Take the first field alone. Here the shock workers of communist labor are working: operators Ganifa Gazanov, whose sculpture made by the USSR national artist, laureate of the USSR state prize P. Sabsayev is located at the VDNKh SSSR [Exhibition of Achievements of the USSR National Economy], Zarifa Mirzoyeva, delegate to the 23rd and 24th CPSU Congresses, Antonina Smolyayeva delegate to the 25th CPSU Congress, and Akhmedgaray Gaziyev and Nakhmet Dadashev who have received a permanent "entry" on the board of honor, foreman of oil, engineer Kasum Akhmedov, and many other honored people.

The young shift of oil workers is growing and being elevated. It is worthily represented by youths recently accepted into the ranks of the party--operators of underground well repair Shaban Akhmedov and Tel'man Makhmudov, machine operator and driver of the lift Magomed Kuliyev, operator for oil extraction Ekram Kerimov, electrician Ismail Dzhamushchuyev and other young workers.

By the common efforts of the toilers of the administration in honor of the anniversaries of V. I. Lenin and the Soviet Azerbaijan 160 tons of oil have been extracted above the plan. These tons were produced with difficulty because drilling of new wells here was stopped a long time ago. But the cheif geologist of the administration Mamedaga Shakhbazov reported pleasant news: preparation has begun for drilling an exploratory well No 3400 planned for the Miocene deposits. The geologists await with hope from Bukhta Il'icha new oil gushers that it endowed the country with in the years of its youth.

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FUELS

HISTORY, CURRENT STATE OF MURADKHANLY OIL FIELDS

Baku VYSHKA in Russian 16 Apr 80 p 1

[Article by V. Gol'tsev: "Generous Deposit of Muradkhanly"]

[Text] The day was sunny. The lakes, canals and the Kura itself that fuse in the vicinity of the Mamedli settlement glistened with stamped silver; several kilometers from here the settlement of drillers and the entire field facilities of the NGDU [Oil and Gas Extracting Administration] "Muradkhanlyneft'" stretched.

For the third year Salman Fataliyev has been its head. But he based himself in Muradhanly much earlier. The reason for this was the restless profession of the geologist. Fataliyev was among the firstcomers whose tireless search for the storehouse of natural fuel in this region of the Mil'skaya plain was crowned with success. Here gushers started to sound, a field developed, and later--a new structural subdivision in the system of the association "Azneft'."

A mass of production questions had be be solved. First of all, of course, it was necessary to discern the nature of the wells drilled in the new field. The fact is that many of them, going into operation with high starting outputs of oil, operated insufficiently stably, and rapidly flooded.

They started from the fact that the research work was sharply intensified, and literally dozens of analyses of the oil and water taken from the wells began to be made daily. The scientific colleagues of AzNIPIneft' [Azerbaijan Scientific Research and Planning Institute of the Oil Industry] gave and give now great assistance to the oil workers in studying the parameters of the wells.

"The goal of the conducted studies," says Salman Fataliyev, "is to know the Muradkhanly resources better that have not been guessed to the end yet."

As an example he names well No 5, the discoverer of the field, drilled on the right shore of the Kura about 10 years ago. When the NGDU "Shirvanneft'" transferred the entire field fund of Muradkhanly to the balance of the new enterprise this well with the help of the pumping jacks barely yielded 2-3 tons of oil per day. Such an output, naturally, could not satisfy the oil workers. Tedious studies began, as a result of which a decision was adopted to make a hydraulic-acid explosion of the bed in the well. The decision proved to be correct: the well began to gush and today it produces up to 15 tons of oil per day.

Other low-output wells were also successfully put on an excellent pattern. However, they are no longer named for the majority of them have started to yield several times more fuel than before. The output of well No 8, for example, has risen from 2 to 25 tons of oil per day.

The outlook for development of Muradkhanly field is the most promising. This is indicated, in particular, by the high output of oil recently obtained from two wells drilled in the new, western section of the oil field. One of them operates stably with an output exceeding 200 tons of oil per day. Currently shafts of six boreholes have been aimed at the oil deposit of this region. Due to the intensive drilling out of the new area the people of Muradkhanly calculate on increasing the daily extraction by the end of this year by more than double.

However, here one is clearly aware that it is impossible to achieve success merely by putting new wells into operation. Therefore everything is being done in order for the old wells to operate with the maximum output.

The Muradkhanly oil causes the oil workers a lot of trouble. It is very viscous and paraffin-base, just wait for deposits of paraffin to be formed somewhere in the pipes and misfortune is not far off. For this not to occur good preventive maintenance of the equipment has been organized at the field. Today from Baku two aggregates have arrived with an oil solvent in the bins. Engineer-technologist Bakir Salakhov, operators Zamnir Guseynov, Sabir Aliyev and Eynulla Garashov, as expected, have prepared the two wells one after the other for pumping through. They then measured their outputs. This work was done with the help of the automatic measuring unit of the type "Sputnik." Now 10 wells are connected to it and the entire process of measuring the liquid takes calculated minutes.

"The equipment is excellent," states the head of the shop for oil and gas extraction Dunyamali Aliyev. "It would be desirable if we were helped to have a second measuring unit of such type. Then all 37 wells of the field will be covered by automatic measurements. This will help to improve the quality of the research and the effectiveness of the conducted geological-technical measures."

The Muradkhanly oil workers have many cares. They, in particular, are worried about the lack of their own shop of oil preparation. This work is now done in Ali-Bayramly where hundreds of tons of oil are pumped every day from Mamedli on the only pipeline. In winter when the oil of the field thickens even at a temperature of +2°C it is not so easy to transport it. For this at six points heating devices have been installed, and at three--pumping stations. But even here in the cold season serious complications arise at times. In January of this year, for example on the section Mamedli-Kyurdamir the pipe ruptured which led to great losses.

Now reconstruction of the oil-collection point is underway; instead of the old pipeline Mamedli-Kyurdamir a new, covered type is being built. Time will show how the system will operate in winter. However they do have their own point of oil demulsification that is the most advantageous in all respects. Therefore the oil workers of the administration are thinking of creating it by their own efforts on the base of the extant oil-collection point.

A great labor upsurge reigns these days in the collective of the NGDU "Muradkhanlyneft'." It is due to the awarding of the Azerbaijan SSR with the Third Order of Lenin and the warm greeting of Leonid Il'ich Brezhnev, the active preparation for the 110th anniversary of the birth of V. I. Lenin, and the 60th anniversary of the Soviet Azerbaijan and the Communisty Party of the republic.

"Never, perhaps," states secretary of the NGDU party committee Fail' Azizov, has our socialist competition taken on such heat. Each oil worker strives to make his contribution to the common success of the collective. Since the beginning of the year over 2,000 tons of liquid fuel above the plan have already been extracted. This means that the socialist commitments adopted in honor of the important anniversaries not only will be fulfilled, but also overfulfilled."

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FUELS

GASIFICATION OF AZERBAIJAN CONTINUES SUCCESSFULLY

Baku VYSHKA in Russian 16 Apr 80 p 3

[Article by A. Ismaylov, first deputy head of Azerbaijan SSR Main Administration of the Gas Industry: "Millionth Apartment Gasified"]

[Text] The collectives of the Azerbaijan SSR Glavgaz [Main Administration of the Gas Industry], having been included in the socialist competition for the worthy meeting of the 110th anniversary of the birth of V. I. Lenin, and the 60th anniversary of the Azerbaijan SSR and the Communist Party of the republic adopted the commitment to gasify the millionth apartment by the day of the significant anniversaries. We are happy to report that this commitment was fulfilled with honor. Over 4.7 million people in the republic today enjoy this marvelous gift of nature.

Before the establishment of Soviet power in Azerbaijan the use of gas as fuel was restricted to certain oil-field regions of Apsheron. In 1920 in Baku only about 2,000 apartments were gasified. The gas industry of the republic began to develp at rapid rates after the 1955 discovery of a large natural gas field in Karadag and the construction of the main gas pipeline Karadag-Tbilisi-Yerevan called the Trunk Line of Friendship.

Currently 101 cities and settlements of municipal type, and over 3,100 rural population points have been gasified. Gas, as a fuel and raw material, is used by over 700 industrial plants, over 13,000 communal and general, and cultural institutions and over 1,600 boiler shops.

In the successful fulfillment of the program for gasification of the cities and villages of the republic a great contribution was made by the collectives of the fourth and sixth construction-assembly administrations, zonal production gas associations in Lenkoran', Ali-Bayramly and Sumgayt.

At the objects of gasification the excavator N. Aliyev, welder M. Faradzhev, mechanics N. Zeynalov, G. Makhmudov, E. Kuliyev and G. Gadzhiyev, foreman A. Kyazimov, head of the shop of major repair A. Medzhidov and many other workers of Glavgaz labored excellently.

An important object of the gas industry in the republic is the construction of the trunk gas pipeline Evlakh-Stepanakert-Nakhichevan'. From this gas pipeline in 1979 natural gas was fed to the cities of Agdam and Stepanakert. This year it remains to guarantee supply of the blue fuel to Shusha, Nakhichevan', and further to Il'ichevsk, Ordubad, Dzhul'fa, Lachin, and to the cities of the Armenian SSR--Goris and Kafan.

Tasks have been defined for the near future. It is planned to gasify another 500,000 apartments, cover with gasification up to 100% of the residential fund in the cities and up to 80% in the rural localities. The total consumption of natural and casing-head gas in the 11th Five-Year Plan will be about 70 billion cubic meters and of compressed gas--300,000 tons.

The workers of the gas industry, inspired by the awarding of the Azerbaijan SSR Order of Lenin and the warm greeting of the General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev on the occasion of the early fulfillment of the five-year plan will apply all efforts to successfully fulfill the assignments of 1980 and lay a strong foundation for the efficient operation in the 11th Five-Year Plan.

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FUELS

DIRECTOR DISCUSSES MUBAREK GAS PROCESSING PLANT

Moscow EKONOMICHESKAYA GAZETA in Russian No 16, Apr 80 p 8

[Article by A. K. Makhmudov, director of Mubarek Gas Processing Plant]

[Text] The personnel of the Mubarek Gas Processing Plant has been steadily increasing the sales volume of their products. The special feature of this enterprise is in the fact that it is operating while being under construction. This brings about quite a few economic problems. How to combine an operating industry with its expansion? This is explained by the director of the plant, A. K. Makhmudov.

In 1967, he graduated from the Moscow Institute of Petrochemical and Gas Industry imeni Gubkin. He worked in the Central Asiatic Scientific Research Institute of the Oil Refining Industry of the USSR Ministry of the Petrochemical Industry as a technological engineer, and then as chief engineer of the experimental plant of the institute. At the present time he is the director of the Mubarek Gas Processing Plant.

Our plant can be considered an experimental enterprise. It has new domestically manufactured equipment which is undergoing experimental industrial testing here. In the course of the operation of the first section, the technology was improved, which made it possible to increase the design capacity by 40%, and, which is most important, to make important conclusions for the construction of the second section of that plant. The first section consists of five technological lines, and the second section consists of three lines. It is more compact. The first section occupies 122 hectares, while the second plant required only 56 hectares. The second section has better and larger equipment. The estimated cost of the second section (its technological lines) is five million rubles less than that of the first section, while their capacities are about the same. The third section of the enterprise which will have the same capacity as the second section is under construction.

I would like to emphasize that, along with soviet builders, hundreds of our Bulgarian friends are working at the construction site. These are complex brigades of Todor Todorov, Todor Ivanov, Dimitr Dimitrov, and others. Bulgarian brigades did one-fourth of the entire volume of construction and installation jobs. Therefore, Mubarek can be rightly called a construction site of great friendship.

The soviet workers include people of many nationalities: Russians, Uzbeks, Ukrainians, and Belorussians. They are working together very harmoniously. This convicingly shows friendship among the peoples, their spiritual kinship, and readiness to do everything in their power for solving the problems set by the 25th CPSU Congress. The following are the best workers: machine operators N. Zulyeva and Sh. Shadyyev, laboratory technician V. Malikov, fitters I. Kuzhakhmetov and N. Mazurov, instrument technician S. Mazur, blacksmith K. Muminov, operator V. Fateyev, and many others.

Formation of the Personnel

We are building up our personnel on the principle of combining experience and youth and are trying to use local people as much as possible. The republic has definite manpower resources on which we can count. But people have to be selected skillfully for this and trained in new jobs. The party organization is systematically engaged in the training of the personnel, their political and labor education, which yields positive results.

The workers who are building and operating the Mubarek Plant understand well the importance of this enterprise. Therefore, they approach the fulfillment of each task with creativity and vigor.

Here are some examples. According to the plan, the second section of the plant was to be put into operation only after its total completion. However, having advised with the designers, leading workers, and engineers, we decided not to wait until its construction is totally completed, but to start operating technological lines as soon as each one of them is completed. The ministry accepted our proposal. As a result of this, additional half a billion cubic meters of gas was delivered to the consumer.

For our enterprise, where unusual climatic conditions cause difficulties with selecting the personnel, it is extremely important to do a large volume of work with fewer workers. The Shchekino method was used creatively. We developed and introduced a system of material incentives for the expansion of the service zone. Additional remuneration of up to 30% of the wage rates of replaced workers was established for operators and shift fitters of technological units.

The situation is somewhat more complicated with the selection of engineers and technologists. Locally there is a shortage of such specialists, and it is very complicated to invite them from other republics. In this connection, I would like to say that it would be desirable to train highly skilled specailists for our and other enterprises of this industry. Living conditions in Kyzylkum are rather difficult: in summer, the temperature in the shade reaches 45 degrees. It seems that a rational way out of this situation would be to organize the training of young people of Mubarekskiy Rayon and neighboring rayons in higher educational institutions of Uzbekistan, including in the field of chemical technology of oil and gas processing in the Tashkent Polytechnic Institute. Such specialists will certainly find employment at the plant.

Fulfilling the directives of the party regarding the improvement of the effectiveness of production and quality of work, the workers and engineers of the plant give much attention to the quality of products and show their initiative and creative approach in this important business. Apart from purified gas, we are producing liquid and lump sulfur. Through the efforts of the personnel, all sulfur is produced with the state Quality Stamp. Some progress has been achieved also in the purification of gas due to the creative cooperation with the institute "VNIPIgazdobycha".

The above does not mean that we have no faults which depend on the administration and the personnel as a whole. We procrastinate too much with the introduction of advanced forms of labor organization provided for in the resolution of the CPSU Central Committee and the USSR Council of Ministers regarding the improvement of the economic mechanism, specifically, the organization of labor brigades. We have some problems with the incentives for the best final results. Competitions are not publicized enough. These faults are being removed by the party organization and the management of the construction project.

Construction Can Progress Faster

However, there are problems whose solution depends not only on the personnel of the operating plant. There have occurred some weak areas which are seriously hindering our work. First of all, this is the lagging in the construction which is not integrated. This affects the production.

With the expansion of the enterprise, there occurred the problem of ensuring the supply of water and steam which are necessary in the process of processing gas, purification of waste water, etc. The volumes of steam production planned by the designers and builders could not satisfy the needs of production. Insufficient coordination of individual sections of the entire construction complex also had its effect. In order to rectify the weak areas, it is necessary to build large additional facilities. For example, a 96-kilometer long Kuyumazar-Mubarek water supply line is now under construction. It will provide additional water supply to the enterprises and the city of Mubarek. Provisions have also been made for the construction of a heat and electric power station with a capacity of 1000 tons of steam an hour. Unfortunately, it still has not been determined who will place the order for the construction of this extremely important facility. In our opinion, it would be the best if the order for the construction of this facility would be placed by the USSR Ministry of Power and Electrification, who is greatly responsible for the supply of power to gas producing enterprises.

We are building a repair and testing station for normal operation of railroad facilities, as well as purification facilities in order to use recycled water in the industrial cycle.

At the present time, two out of the three technological lines of the second section of the plant are in operation. However, according to the schedule, the entire second section should have been operating at the end of last year. A production assignment was given to our enterprise with consideration for the schedule of the introduction of new capacities. Beginning with the third quarter of 1979, provisions were made for the introduction of one unit with a capacity of two billion cubic meters of gas a year and in the fourth quarter -- of two units (two lines) with a total capacity of three billion cubic meters of the "blue fuel".

What were the reasons for not observing the established deadlines for the introduction of new capacities?

The builders explain this by weakness of the material base and the shortage of skilled personnel. Of course, this is true. The construction base needs substantial expansion and strengthening. But the delays in the introduction of new capacities depend just as much on the nonintegrated approach. One facility is built, but they forget about the second one, while the first one cannot operate without the second. This situation developed, for example, in connection with the provision of steam for the technological lines of the second section. The builders had to build a boiler room of five boilers with a capacity of 75 tons of steam an hour each. Two of them were to be completed last year. However, it was not done according to schedule. In order to start two technological lines, we had to reconstruct the boiler of the first section and connect one standby boiler to the new technological lines with the help of the institute "VNIPIgazdobycha". Of course, it was not a way out of the situation. In 1979, the builders started organizing a Mubarek mobile mechanized unit of the trust "Uzbekgidroenergostoy" [Uzbek Trust for the Construction of Hydroelectrical Facilities] (G. Isayev, manager).

Just a little over a year has passed since the day when the independent trust "Mubarekgazpromstroy" was organized on the basis of the construction administration No 6 of the trust "Bukharagazpromstroy". In our opinion, the trust "Mubarekgazpromstroy" must be expanding and specializing. Only under these conditions it will be able to put the capacity of the gas processing plant into operation on time. This is the largest project of the trust, and the volume of work will be growing here every year.

As new facilities are put into operation, the number of workers at the plant increases. Later on, the personnel of the plant will be increasing even more, since new capacities will start operating. However, we are concerned about the labor turnover. Inadequate housing is no less important. For example, last year not a single residential building was built for the workers of the enterprise. Only 200,000 rubles were used last year for housing construction out of the planned 500,000 rubles. And this year, two million rubles were allotted for housing construction. There arises an urgent problem of creating a specialized administration for housing construction.

The personnel of this enterprise is aware of its responsibility for satisfying the needs of the country with an important source of fuel and raw materials. Our workers and specialists are doing their best to fulfill the plan with the operating facilities.

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CSO: 1822

FUELS

BAKU REFINERY, NET OUTPUT DETAILED

Baku VYSHKA in Russian 29 Mar 80 p 2

[Article by G. Chernysheva, chief of Planning Department of NBNZ imeni Vladimir Il'ich: "Let Us Prepare To Work in a New Manner"]

[Text] Conversion of enterprise operations to new indicators and economic norms, including those on production instead of gross or net (normative) product, is provided in the decree of the CPSU Central Committee and the USSR Council of Ministers "On improving planning and intensification of the effect of the economic mechanism to increase production efficiency and work quality." As noted at the February (1980) Plenary Session of the Central Committee of the Azerbaijan Communist Party, the enterprises of a number of sectors, including those of the petroleum refining and petrochemical industries, should convert this year to the net product index. The first petroleum refining plant where it is planned to introduce the net product norm should be the NBNZ [Novo-Baku Petroleum Refining Plant] imeni Vladimir Il'ich.

Our collective began preparation to work under the new conditions as early as last year. Materials were prepared on the fraction of direct material expenditures in the wholesale price of the enterprise's product separately for all types of petroleum products and were presented to Gosplan of the republic and to the State Pricing Committee of the USSR. Through the efforts of the norm-research station, the ministry investigated all the production plants. Measures were worked out on the basis of this investigation to reduce the use of heavy manual labor at them.

It should be said immediately that as soon as we began to calculate the net production norm, many new problems occurred. Although it is impossible to say that the plant has proceeded on an uncharted path--enterprises of the Bashneftezavody Association and a number of other plants of the sector have already been operating for three years by the net product index. However, we had to take into account the specific conditions under which our enterprise is operating. The results of our enterprise's activity in 1978 were taken as the basis of calculations.

We determined the net product norm for a number of petroleum products by the mean specific coefficient for the product, found as the ratio of the cost of a ton of produced petroleum product to its wholesale price. For each of these petroleum products, it was compared to similar products at other plants of the sector where this norm has already been worked out according to the existing method.

It was impossible to determine the norm by another method since a number of "whole" products produced, for example, during catalytic cracking, is realized at a different price and it is refined on different types of installations where production processes differ from each other.

For example, the net product norm was much higher for sulfur and low-sulfur diesel fuel, aviation kerosene distillate and so on, which are processed by the ELOU-AVT installation, than on other installations for primary oil refining. This is related to the fact that the level of conditionally constant flow rates related to the high cost is high on the new installation. Moreover, the capacity of the installation is sometimes not completely utilized due to underdelivery of oil.

The same high net product norm was also achieved in calculations on some other types of petroleum products since the propane-propylene fraction, for example, includes the product of a number of installations, where the extent of recovery was reduced due to a shortage of raw material and deterioration of its qualitative composition.

The fact that the profitability of our enterprise's operation decreased sharply during the 10th Five-Year Plan also caused much concern in calculation of the net product norms. Whereas it was at the level of 71.1 percent in 1976, it was 42.3 percent in 1977, 21.2 percent in 1978 and dropped to 13.9 percent in 1979. This is related to the fact that the fraction of secondary processes in petroleum refining, which require large labor expenditures, was reduced at our plant in 1977-1979 and the volume of low-quality and "inexpensive" products such as sulfur mazut increased.

The main reason for the developed situation may perhaps be the unsatisfactory operation of the catalytic cracking installations. As a result the growth rate of net product during the previous years of the 10th Five-Year Plan significantly surpasses this same indicator if it is calculated by the net product norms. The same trend is also observed by the labor productivity index. When using the net product norm, it more clearly characterizes the real contribution (labor) of the collective to the produced product. For comparison I note that the growth of labor productivity calculated by the net product norm exceeded the same index calculated by the gross product norm during the first year of the 10th Five-Year Plan, when the growth of the volumes of production was accompanied by an increase of the fraction of secondary processes, which reached 27 percent.

It should be said that our work in calculating the net product norm was approved at the Ministry of the Petroleum Refining and Petrochemical Industry of the USSR. Only the correction which takes into account the fund capacity rather than the cost in calculating the profitability norm of the enterprise's operation was introduced.

The work which we carried out permits one to reach specific conclusions about the effect of the net product index on an increase of production efficiency at the plant. It is obvious that it has an undisputed advantage over the net product index--it clearly reflects the fraction of secondary processes in petroleum refining. An increase of production volumes by this method yields an important addition to the net product. This is especially important at the present stage of enterprise development, when our main reserve with regard to the limitation of raw material deliveries became the continuous growth of the extent of petroleum product separation. Moreover, the net product index is a stimulus toward producing a high quality product.

These advantages of using the net product index are especially obvious if there are changes in the structure of enterprises: the growth dynamics of the gross and net product indices then differ sharply. For example, the growth in the product of sulfur oil refining, which had a negative effect on the quality of petroleum products in 1978 and 1979, also led to a decrease of the net product index. But the increase of the fractionof secondary processes (production of high-quality AI-93 gasoline) planned in 1982 and for the entire 11th Five-Year Plan, as a result of putting the catalytic reforming installation into operation, will provide us with an important increase of net product which should surpass the gross indicators.

But in order to finally convert to operation by the new method, a number of problems must still be solved. The net product index at this stage of development does not fully reflect the efforts of the collectives of production installations in the struggle to economize on material resources. Moreover, to successfully utilize the new index, we must complete more rapidly the work to compile the plant certification which reflects its fund capacity, organizational and technical level, production specifics and a number of other important factors.

The plant collective is confident that, by actively introducing the new indices and norms and by persistently improving the management mechanism, it will achieve new successes in the struggle to increase production efficiency and produced product quality.

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FUELS

COAL ENRICHMENT IN CARPATHIAN AREA

Tula KOMMUNAR in Russian 17 Jan 80 p 1

[Article by TASS correspondent Yu. Romanov: "The Interior Is Becoming More Generous"]

[Text] An important reserve for increasing coal mining has been put into operation in the Carpathian area. The central enrichment plant of the Production Association Ukrzapadugol' with capacity of 9.6 million tons of coal annually became operational here today.

Start-up of this enterprise will permit the miners of the L'vov-Volynsk coal basin to begin mining the fuel from seams which were previously not exploited due to the high ash content. The service life of all the 22 operating mines here will be increased 1.5-2-fold.

Manual labor has been completely eliminated at the new plant and control and monitoring of equipment operation through the entire production chain are being accomplished for the first time from a central dispatcher's console. The production cycle is being accomplished by progressive technology which makes it possible to bring the coal content in the concentrate up to 90 percent. Considerably fewer railroad cars are now required to haul the enriched fuel to the Burshtynskaya and Dobrotvorskaya GRES.

The collective of the new enterprise has taken the pledge to assimilate the production capacities three months ahead of schedule.

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CSO: 1822

FUELS

PIT COAL HYDRAULIC TRANSPORT SYSTEM UNDER CONSTRUCTION

Moscow IZVESTIYA in Russian 6 Feb 80 p 1

[Article by B. L'vov: "Coal Through Pipelines"]

[Text] Investigations have been organized to design the facilities of a pit coal hydraulic transport system from the Kuzbass to Novosibirsk. This unusual transport conveyor includes high-capacity crushers, pumping plants to pump the coal slurry and cleaning and drying units.

Hundreds of thousands of tons of coal will move along the underground highway by means of the hydraulic transport system from the mines to the furnaces of electric power plants. The fuel will reach the point of destination within hours. More than 1,100 heavy rail cars annually will be released to transport other national economic goods.

Specialists of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises], Minugleprom [Ministry of the Coal Industry] of the USSR and Minenergo [Ministry of Power and Electrification] of the USSR, in cooperation with the machine builders of Mintyazhmash [Ministry of Heavy Machine Building], and Minkhimmash [Ministry of Chemical and Petroleum Machine Building] will carry out intensive preparation to develop the first experimental-industrial coal pipeline. The length of the run from the Inaskaya Mine, which is located at Belovo, Kemerovskaya Oblast', to Novosibirsk TETs-5 is 250 kilometers. The capacity of the pipeline is 4.3 million tons of coal annually.

The functions of the general designer of the line part of the pipeline with pumping stations have been entrusted to the collective of the VNIIPItransprogress Institute [expansion unknown]. Construction of an experimental hydraulic stand by which new engineering solutions will be checked is under way at its experimental area near Moscow. The pumps and fittings for the main coal hydraulic transport systems, calculated for pressure of 120 atmospheres, will also be tested here.

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SINGLE PRICE FOR PIPELINE-DELIVERED CRUDE URGED

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 3, Mar 80 pp 19-20

[Article by L. D. Vasyuk and G. Sh. Kudoyarov of the Scientific-Research Institute for the Transportation and Storage of Petroleum and Petroleum Products: "A Single Price for Crude Oil Delivered to Refineries by Trunk Pipelines"]

[Text] The theoretical justification and argument for the need to establish a single price for crude oil is obvious. And so there has been an ever-increasing number of proponents of a single price for crude in recent years. In our view, it is desirable right now, in resolving the question of the next review of crude-oil prices, to take the first step toward solving this problem--to establish a single price for crude delivered to refineries, dispensing with differentiated prices by groups of NPZ's [oil refineries]. Since there is no general criterion either for determining the number of pricing zones or for fixing the quantitative gap between pricing zones, then the grouping of refineries by pricing zones that is being used loses all meaning. This grouping is now being made by a purely empirical method and it can be curtailed or expanded as desired. Under this price-setting practice, it is completely possible for all refineries to be amalgamated into one group.

Despite the fact that, as before, under a single price for crude profitable delivery thereof throughout all areas is not provided for (under a single price, the delivery of crude to 13 refineries proves to be unprofitable), single pricing should be given preference since it has the following advantages: first, it assures the oil-refining industry relatively equal economic terms for acquiring raw materials; second, it facilitates accounting and planning of expenditures for the purchase and sales of crude; and third, after a number of years a single price for crude that is figured on industry-wide average costs will reflect more objectively the socially necessary expenditures for labor for the the purchase, transporting and marketing of crude. An evaluation that we have made of the financing-management activity of trunk oil pipelines where a single price is introduced for crude that is deliveried to refineries has indicated that the single-price variant is completely acceptable, since it provides pipeline transport as a whole with regular economic accountability terms. And all pipeline transport enterprises can be assured relatively normal economic accountability terms under single pricing by the use of accounting prices among oil pipeline administrations (except for two UMN's [trunk pipeline administrations]--the Caucasus and Turkmen administrations). Profitable operation cannot be provided for these administrations under single pricing, so, in order to avoid subsidization of enterprises in the industry, except for Azerbaijan NPZ's and the Batum and Krasnovodsk NPZ's, it is probably desirable to establish an individual price for oil delivered by the indicated UMN's.

A single price should be established for all types of petroleum, including special types. Higher prices should not be set for special petroleum products, in order to avoid the accelerated production of them. Nor is there a need to differentiate the industry's wholesale prices by the sulfur content of the crude. An analysis of shipments of crude to refineries that takes sulfur content into consideration indicates that the overwhelming portion of the total volume of deliveries consists of crude that has the average percent of sulfur content. Oil with a higher sulfur content arrives only at a small group of refineries, and this raises doubt as to the desirability of such a differentiation, the more so since a crude's sulfur content is its natural characteristic and does not depend upon the efforts of the workers' collectives involved in recovering and transporting that crude. In our view, in order to equalize economic accountability terms for oil refineries, it is desirable to examine the problem of introducing income payments in the oil-refining industry as a function of the quality of the oil to be refined (as a function of its sulfur content).

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upravleniya i ekonomiki neftegazovoy promyshlennosti
(VNIIOENG), 1980

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COMPLETED PIPELINE CONNECTS OFFSHORE OIL FIELD

Baku VYSHKA in Russian 17 Apr 80 p 1

[Article: "Oil Pipeline in Operation"]

[Text] The first oil of the offshore field imeni 28 Aprelya arrived at the reservoir park of Neftyanyye Kamni. The fuel is transported on a pipeline constructed by the SMU-3 [construction-assembly administration] collective of the trust "Kaspmorneftegazstroy." The Caspian field engineers gave their word to complete construction of the new main by the 60th anniversary of the Azerbaijan SSR and the Azerbaijan Communist Party. They fulfilled their commitment ahead of schedule.

The line they built is the deepest-water line in the country. Its pipes were laid on the bottom of the sea under a water mass reaching 85 meters. At this depth the brigade of Hero of Socialist Labor Israfil Guseynov also drilled their first well that announced the opening of the new and promising field with a powerful gusher. Now the tunnelers are making the second well on this section. And it has been decided to drill a total of nine wells from the "lucky" steel island.

Construction of the new oil pipeline was carried out with the help of the specialized pipe-laying ship "Suleyman Vezirov." The pipes were welded on its deck into lengths, while the x-ray unit verified the reliability of the butt joints, after which the oil pipeline was laid on the bottom. Such organization of work considerably accelerated it and facilitated the labor of the builders who laid 800 meters of pipe in a day.

As the correspondent of Azerinform was told in the trust "Kaspmorneftegazstroy" the next step is construction of the fourth branch of the 30-kilometer product-line from the Bulla-more field to the shore. The lengths are already being welded for this line.

Preparation is also underway for the construction of an underwater line that will connect Neftyanyye Kamni with the island of Zhilov. Its putting into operation will release a whole flotilla of tankers that now deliver fuel from the island field to the Apsheron peninsula.

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FUELS

Briefs

OIL AND GAS PROSPECTING--Khanty-Mansiysk--Yet another, the fifth in the system of Glavtyumen'geologiya [Main Administration for Geology in the Tyumen' region], Production Association for Oil and Gas Prospecting has been created. It contains three large geological prospecting enterprises of the northern regions: the Krasnoleninsk and Pravdinsk oil and gas prospecting expeditions and the Pravdinsk derrick-installation office. The new, just created Vostochno-Megion prospecting expedition, which is part of the young association Megionneftegazgeologiya [expansion unknown] is making the first, but confident steps on the workers' paths of the five-year plant. The expedition collective is faced with discovery of wide exploration horizons. It must investigate 30 promising areas. [Text] [Moscow IZVESTIYA in Russian 29 Feb 80 p 1] 6521

NATURAL BITUMENS--A new laboratory was opened today at the All-Union Oil and Gas Scientific Research Institute. Specialists of this laboratory are engaged in study of natural bitumens--one of the types of a complex mineral and valuable energy raw material. Moreover, bitumens find application in the chemical and metallurgical industry for production of sulfur, nickel and coke and will be used in construction. "Special equipment has been developed for the laboratory," relates the director of the institute Doctor of Technical Sciences, Professor G. Vakhitov. "This apparatus will make possible precise investigations of the physical and chemical properties of natural bitumens and will permit determination of the characteristics of production and refining of the valuable raw material." We have already received the first bitumen specimens from different regions of the country. One of the main tasks, solution of which the laboratory workers have taken on themselves, is development of a multipurpose program for bitumen production and efficient use of them. [Text] [Moscow VECHERNYAYA MOSKVA in Russian 17 Mar 80 p 1] 6521

OIL TANK CONSTRUCTION--Surgut--Construction of an unusual piling foundation for the first gian oil reservoir was begun at one of the pumping stations of the Surgut-Poltsk pipeline. An enormous metal tank for 50,000 cubic meters of fuel was set on pilings for the first time in domestic practice. An increase of the volume of oil storage tanks 2.5-fold required careful investigations. A total of 1,800 ten-meter reinforced concrete pilings are driven for each 50,000 cubic meter tank, the tank diameter exceeds 60 meters and the weight of the structure is 700 tons. [Text] [Moscow IZVESTIYA in Russian 21 Feb 80 p 1] 6521

NEW OIL PIPELINE CONSTRUCTION--The "red joint" was welded yesterday not far from Gor'ky on the next 800-kilometer section--from Perm' to Gor'ky--of the new transcontinental Surgut-Polotsk oil pipeline. More than 2,000 kilometers of this route have already been covered on the difficult ground of the northern Ob' area, the Urals and the Transvolga area. The Surgut-Polotsk oil pipeline will become the largest major pipeline--its length will exceed 3,300 kilometers. It will ensure extensive delivery of Siberian oil to the center and to the western part of the country. The Siberian oil has already been put into operation--hundreds of thousands of tons of additional fuel have been extracted from it at the Urals plants. Their oil river will now approach ever closer to the center of the country. [Excerpt] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Feb 80 p 1] 6521

PETROLEUM PRODUCTION--The design capacity of the unit has been exceeded by 75 percent during several reconstructions of one of the installations at the Novo-Yaroslavl' Petroleum Refining Plant. And it has now almost doubled. How is this so? The columns of the petroleum refining installations "originated" inside tens of steel plates, by means of which the oil is separated into its constituent parts. Plant specialists together with scientists of the Moscow Institute VNIIneftemash [expansion unknown], introduced plates of new design on one of the columns of this installation, which was done during a planned major overhaul of the column. When it was started up, the productivity of the installation increased sharply. Modification of the plates yielded a more than 200,000-ruble saving to the enterprise. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Feb 80 p 2] 6521

PRODUCTION RECORD--The billionth ton of oil since the beginning of the five-year plan was produced in the fields of Western Siberia. This is almost double that previously produced here during the Eighth and Ninth Five-Year Plans taken together. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 11, Mar 80 p 3] 6521

SUBMERSIBLE PUMP PRODUCTION--Kazan'--The Submersible Electric Pump Plant--a new construction project of the Tatar city of Al'met'yevsk--began serial output of the product. The first lots of products were sent to the oil fields of this autonomous republic and adjacent Bashkiriya. Al'met'yevsk engines have an unusual shape. These are large "pencils" approximately 10 centimeters in diameter and more than three meters long. They are lowered together with the pumps to the bottom of the wells more than 1.5 kilometers deep. The oilfield workers increase oil production in this manner. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 5 Mar 80 p 1] 6521

GAS WELL DRILLING--Baku--A well drilled in the Caspian Sea near Bulla Island was connected yesterday to the main gas pipeline. It yields 200 tons of gas condensate and 800,000 cubic meters of gas per day from a depth of

5,680 meters. The brigade of foreman T. Aliyev and I. Medvedev, which drilled the well, had to overcome many difficulties. Gas blowouts and the appearance of water in the column complicated drilling. But the drillers tamed the natural elements. Drilling through a thousand meters of rock above the task, the collective reported on fulfilling the five-year plan and socialist pledges in honor of the 110th anniversary of V. I. Lenin's birth. The field near Bulla Island is one of the most promising in the Caspian. [Text] [Moscow TRUD in Russian 13 Mar 80 p 1] 6521

CASING-HEAD GAS--The flames have been extinguished. The use of casing-head gas has made it possible to extinguish several more flares in the oil fields of the Central Ob' region. The Yuzhno-Balyk Gas Refining Plant (Tyumen'skaya Oblast) has reached design capacity. Instead of being burned off in flares, one-half billion cubic meters of gas now produced at the fields together with oil will now be sent to the Surgutskaya GES for fuel and will become a valuable raw material for petrochemical enterprises. [Text] [Moscow PRAVDA in Russian 21 Feb 80 p 2] 6521

GAS CONDENSATE PRODUCTION--A powerful flow of gas condensate has been produced for the first time at the Urengoy field from a depth of 3,560 meters. Urengoy extends for 100 or more kilometers from north to south in swampy tundra. This year it should provide practically the entire increase of natural gas production in the country. More than 10 pools of the blue fuel, arranged in "stories," have already been discovered here. And now here is a new Urengoy story. This year the Tyumen' geologists will drill 1,250 meters of test wells--1.5 or more times more than last year. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 24 Feb 80 p 1] 6521

COAL PRODUCTION--Not one miner entered the Tkibuli Mine imeni V. I. Lenin on 22 February. Only several persons occupied chairs near the remote underground machinery control console located on the surface. The following notation was entered in the log at the end of the shift--the task had been fulfilled by 150 percent. Labor productivity was tripled. The Mine imeni V. I. Lenin is the first in the production association Gruzugol' where coal production has been completely mechanized after reconstruction. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 24 Feb 80 p 1] 6521

PUMP PRODUCTION--The Machine Building Plant imeni Dzerzhinskiy is producing a new product--bushingless pumps. They are now undergoing trials in different oil producing regions of the country and orders for them are increasing. A total of 3,430 of these pumps has been produced since the beginning of the year. A semiautomatic honing machine was recently introduced for finishing machining of the pump cylinders, whose length comprises several meters. It was manufactured at the Experimental Plant of VNIIPTneftemash [expansion unknown] from a design of its specialists. [Excerpt] [Baku VYSHKA in Russian 8 Apr 80 p 1] 6521

PEAT PRODUCTION--The northern swamps which occupy a large area of the Komi ASSR are a rich natural storehouse for agricultural workers. This was confirmed by the many years of labor of geologists who investigated a number of regions of the autonomous republic at the request of reclamation specialists. The volume of natural peat reserves numbers two or more billion tons. "The last year of the five-year plan will become one of intensive assimilation of the reserves of a valuable natural raw material," said the Ministry of Reclamation and Water Management of the Komi ASSR A. Lavrenov. "Construction of the first unit of a large peat-processing enterprise has been constructed near Syktyvkar. This spring it will begin to deliver a product for the farms of suburban rayons. A total of 500,000 tons of raw material annually will be produced here. Moreover, peat production in the bogs of other agricultural regions of the republic has been organized. [Text] [Moscow IZVESTIYA in Russian 11 Mar 80 p 2] 6521

AUTOMATION OF OIL PRODUCTION--The oil workers of the Chernigov area were the first in the republic to convert to an automated production control system. The "ASU [Automated control system]--petroleum" complex has become operational at the Chernigovneftegaz Administration [expansion unknown]. It is equipped with "Sputnik" installations by use of which the operation of wells is monitored and liquid fuel is measured directly in the fields. The transceiving apparatus issues the required data to the regional dispatcher stations where all the information is processed and it then goes to the computer center of the Ukrneft' Association. [Text] [Kiev PRAVDA UKRAINY in Russian 27 Feb 80 p 2] 6521

WELL DRILLING--Tyumen'--One of the most difficult technological operations for well drillers is testing drilled wells. That is why workers of the UkrNIIgaz Institute, who delivered new apparatus for monitoring the hydrate formation process in wells were greeted so warmly at the Yamalneftegazgeologiya Association. According to calculations of scientists, its introduction makes it possible to reduce the testing time of explored wells by 25 percent and to significantly facilitate the work of geologists-drillers. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Feb 80 p 2] 6521

GASOLINE PRODUCTION--Yakutsk, 23 Feb 80--The first experimental installation for production of automobile fuel from gas condensate has become operational at the Mastakh Gas Field near Vilyuysk. Gasoline of mark A-76 is produced here by the distillation method. The State Symbol of Quality has been awarded it. This fuel is five times cheaper than imported fuel. In cooperation with scientists, specialists of the Yakutgazprom Association [Yakutsk Gas Production Association] are improving the technology of condensate refining. It is planned to produce gasoline from it at the Srednevilyuysk and other gas fields. [Text] [Moscow PRAVDA in Russian 24 Feb 80 p 1]

GASOLINE FROM NATURAL GAS--A small installation developed by scientists of the All-Union Scientific Research Institute of Natural Gas, makes it possible to produce gasoline and diesel fuel from gas condensate directly in the fields. Its advantages are its low cost, ease of manufacture and installation and compactness. Operation of the innovation installed at the Urengoy Gas Condensate Field provides an annual saving of more than one million rubles. A standard small installation in the block version for refining gas condensates different in quality into motor fuels is now being developed at the institute. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Jan 80 p 2] 6521

COAL MINING--Angren, Tashkentskaya Oblast, 25 Feb 80--The fodder lands of sovkhozes Oktyabr' and Sergo, located near Tashkent, are literally being moved. A 100-hectare plantation of alfalfa belonging to the farmers was located above a thick coal seam. Miners of the Angren Strip Mine began a large operation to transfer the fertile field one kilometer south of the strip mines. Excavators carefully removed the top layer of soil. Dump trucks delivered the soil to rocky wasteland, where fodder crops have already been sown this spring. [Text] [Moscow PRAVDA in Russian 26 Feb 80 p 3] 6521

PIPELINE CONSTRUCTION--Uray, Tyumenskaya Oblast, 27 Feb 80--The Krasnoleninskiy Svod-Shaim Pipeline will provide reliable recovery of oil from the new group of Tyumen' fields. The first kilometers of this underground route were installed today. The length of the steel pipeline is short--160 kilometers. But the extensive swampiness of the route extended the construction deadlines--work can be carried out only in winter when the ground is frozen. To utilize this time to the maximum, the Siberian workers completed preparatory work beforehand: they constructed a small city of rail cars and laid the spur tracks. Krasnoleninskiy Svod, where several fields have been found, was recently transferred by geologists to the oblast map. Oil leaves here into the existing pipeline systems which supply the central regions of the country with fuel. The steel mainline will become operational this year. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Feb 80 p 1] 6521

HEATING SUPPLIES--A total of 38,900 cubic meters of wood and 25,300 tons of coal briquettes was allocated for the first quarter of 1980 to supply heat to schools, kindergartens and medical institutions and for sale to the populace. Only 4,000 cubic meters of wood and 5,000 tons of briquettes had been realized as of 1 February. Our permanent suppliers--Zapuralleesnabsbyt, Kirovlessnabsbyt and Chelyabuglesbyt--are freezing people. The regional and municipal fuel organizations of Tatariya have been placed in an extremely severe situation due to unsatisfactory shipment of wood. Since the heating season is still continuing, they were forced to appeal for action against the suppliers. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 22 Feb 80 p4] 6521

COAL SUPPLIES--Beginning year before last, our plant is being poorly supplied with coal and the workers are primarily suffering from this. The plant was frequently idle last year due to a shortage of fuel and wages were low as a result. Moreover, the plant did not deliver heat to the homes where we live. And the situation has not changed this winter. Again there is no coal, the plant is idle and the workers are cold in their apartments. We have repeatedly raised this question at workers' meetings, but the plant administration cites the fact that the L'vov Office of Uglesnabsbyt, located at Novovolynsk, delivered less than half the planned quantity of coal during the fourth quarter. This response does not warm us at all. [Text] [Moscow TRUD in Russian 21 Dec 79 p 2] 6521

COAL ENRICHMENT PLANT--The Chervonograd Central Enrichment Plant has produced its first product. The new enterprise, whose annual output is 9.6 million tons of coal, has enormous significance for increasing the quality of the fuel mined in the mines of the L'vov-Volynsk Basin. The fact is that the high ash content of Bug area coal cannot be significantly reduced under underground working conditions. The enrichment plant reprocesses it to a low-ash concentrate by the flotation method. Whereas, for example, the mines plan to reduce the ash content by only 0.1 percent today, the ash in the coal will be 20 percent less after enrichment. After being brought up to design capacity, the Chervonograd Enrichment Plant will become an important link of the complex product quality control system in the entire L'vov-Volynsk coal basin. [Text] [Kiev PRAVDA UKRAINY in Russian 27 Jan 80 p 2]

COAL ENRICHMENT ENTERPRISE--The USSR's largest coal enrichment enterprise has become operational at the Production Association Ukrzapadugol'. It will begin to process 9.6 million tons of high-grade concentrate annually--32,000 tons per day. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 6, Feb 80 p 2] 6521

OIL FIELD COMMUNICATIONS--A mobile communications terminal has become operational at one of the Samotlor satellites--the Pokachevskoye oil field. It contains an ATS [Automatic telephone exchange] for 100 numbers, a long-distance switchboard, a radio station, a teletype and telegraph communications apparatus. Operational communications of the field with the services of Glavtyumenneftegaz [Main Tyumen' Administration for Oil and Gas Production] and Minnefteprom [Ministry of the Petroleum Industry] and also with any point of the Soviet Union has now been provided. Whereas 3-4 months were required previously to install the communications terminal at the field, it can be assembled within one week in the block version. Designers of the Sibkomplektmontazh Association and specialists of the Communications Administration of Glavtyumenneftegaz developed and introduced the innovation. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Jan 80 p 2] 6521

OFFSHORE DRILLING--The family of offshore drilling rigs of the All-Union Association Kaspmorneftegazprom has been supplemented. The semi-submersible offshore drilling rig, constructed in Finland on order of the Soviet Union, has arrived. This unique structure having no equal in our country consists of two matched floats which can be submerged 14 meters during drilling operations. Test wells can be drilled up to six kilometers deep through water up to 200 meters deep in any weather by using this rig. [Text] [Moscow IZVESTIYA in Russian 16 Jan 80 p 1] 6521

COAL ENRICHMENT PLANT--The equipment of the Central Enrichment Plant constructed in the L'vov-Volynsk coal basin is being brought to operating conditions. The first product--low-ash concentrate--has already been produced. The new enterprise, considered one of the largest in the Ukraine--is an important link in the production conveyor of coal-mining production along the Western Bug River. [Text] [Moscow IZVESTIYA in Russian 20 Jan 80 p 1] 6521

MURAVLENKOV FIELDS PIPELINE--Work has begun in northern Tyumenskaya Oblast to lay an underground route, which will connect the Muravlenkov fields with the major oil pipeline system. Since the beginning of the five-year plan, the workers of Glavsibtruboprovodstroy have provided delivery of oil and gas to the central regions of the country from 23 fields, having laid approximately 7,500 kilometers of steel arteries. It was decided at a meeting of the most active economic members of the board to complete the five-year plans of construction-installation work by the 110th anniversary of V. I. Lenin's birth. [Text] [Moscow IZVESTIYA in Russian 25 Jan 80 p 1] 6521

ARCTIC OIL--The rates of oil production in the northern oil fields were not disrupted by -40° weather. Careful preparation provides normal operation of oil wells. The first million tons of oil and gas condensate were extracted from the interior three days earlier than the planned deadlines. It is planned to produce a record amount of oil--more than 20 million tons--this year in the fields of the Komi ASSR. [Text] [Moscow IZVESTIYA in Russian 22 Jan 80 p 1] 6521

OIL DISCOVERIES--The prospectors of Tomskaya Oblast discovered the first liquid fuel storehouse this year. The brigade of V. Suchkov produced an oil gusher on the new Karayevskaya area. This collective is renowned for its skills. The well testers are confidentaly greeting the pre-anniversary Leninist socialist competition. [Text] [Moscow IZVESTIYA in Russian 24 Jan 80 p 1] 6521

SURGUT-POLOTSK OIL PIPELINE--Operations on the next 800-kilometer section of the Surgut-Polotsk oil pipeline, stretching from Perm' to the Volga River were completed with a "red joint." The pipeline, which permits supplementation of the fuel and energy potential of the Volga region, the Urals and the center of the country, was constructed ahead of the state normative deadlines. A new stage of construction is ahead--laying the western branch of the pipeline from Gor'kiy to Polotsk. The first tens of pipeline kilometers have already been welded here. The length of the major pipeline will exceed 3,300 kilometers upon completion of all operations. [Text] [Moscow IZVESTIYA in Russian 10 Feb 80 p 2] 6521

TEST WELLS--The Urals machine builders have organized production of improved drilling rigs for cluster drilling of deep test wells. The new unit is equipped with a complex of mechanisms which significantly facilitate lowering and raising the drill string. These drill rigs will permit the prospectors to drill 16 wells each more than 4,000 meters deep--almost 1.5 kilometers further than previous rigs. [Text] [Moscow IZVESTIYA in Russian 10 Feb 80 p 2] 6521

DRILLING OPERATIONS--A truck-train consisting of powerful tractors and machines of high trafficability established a new route to the interior of the Karakumy. The drillers of the Chardzhou Prospecting Administration began to install the first rig in the area of Chartok, within which are located gas-bearing pools. The installers assemble the production equipment, surpassing the deadlines established for them. At the same time the apartment buildings of the workers village and the first desert arrivals are being erected among the sand dunes. The new site is located on the flank of the recently discovered Malayskoye gas field. Intensified exploration of the gas pools on 16 promising structures is now under way. The assault on the Karakumy will be continued during the next five-year plan. The prospectors have to develop four new pools. [Text] [Moscow IZVESTIYA 12 Feb 80 p 3] 6521

PETROLEUM PRODUCTION--Ukhta, Komi ASSR, 1 Feb 80--The oil field workers of the Komineft' Association have shipped the millionth ton of oil to users since the beginning of this year. And they have pumped 50 million tons of liquid fuel from the depths during the 10th Five-Year Plan. Almost as much fuel was produced here during the two previous five-year plans. Three-fourths of the total volume of the "black gold" is produced by the Usinsk field, connected to Yaroslavl' by a 1,500-kilometer pipeline. [Text] [Moscow PRAVDA in Russian 2 Feb 80 p 2] 6521

RURAL GASIFICATION--Gasification of rural apartments in Tselinogradskaya Oblast--one of the largest granaries of the republic--has been completed. Gas burners have been installed in the last apartment buildings of the central farmsteads of the remote sovkhozes Karamyshevskiy, Shuldyz and Zarechnyy. A total of 1.2 million apartments of rural residents has been gassified in Kazakhstan. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 10 Feb 80 p 1] 6521

EXCAVATION EQUIPMENT--A new powerful electric excavator designed for the Urgal' Mining Administration, has been developed at Uralmash. The State Symbol of Quality has been awarded to the machine. The excavator with the mark UZTM will work on construction of coal-mining enterprises in the eastern sector of the Baykal-Amur Mainline Railroad. Its equipment, quality of assemblies, reliable automation and heated driver's cab will permit operation of the excavator at -40° temperatures. [Text] [Moscow IZVESTIYA in Russian 5 Feb 80 p 3] 6521

DRILLING RIG PRODUCTION--Sverdlovsk--The Urals machine builders have organized production of improved drilling rigs for cluster drilling of deep test wells. The new unit is equipped with a complex of mechanisms which significantly facilitate lowering and raising the drill string. These drilling rigs will permit the drillers to drill 16 wells each of more than 4,000 meters. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 10 Feb 80 p 1] 6521

COMPRESSOR STATIONS--The Dalmatov Compressor Station has become operational. Start-up of it permitted a significant increase in the flow of gas through the Urengoy-Chelyabinsk gas pipeline. The socialist competition of related collectives helped the builders to successfully complete construction of the facility. [Text] [Moscow IZVESTIYA in Russian 6 Feb 80 p 1] 6521

GAS EXPORTS--Paris, 30 Jan 80--Soviet gas has begun to flow to France through the 3,000-kilometer pipeline which passes through Austria and West Germany. A number of French cities, including Chatillion-Sur-Seine and Barre, are already being supplied. Deliveries of Urals gas to France will reach four billion cubic meters this year, which comprises one-seventh of the annual gas needs of the country. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Jan 80 p 3] 6521

OIL PIPELINE CONSTRUCTION--The work rates on construction of the pipeline from the Var'yeganskoye oil field to the Belozernyy gas-refining plant have been accelerated with the onset of severe frosts in the northern regions of Tyumenskaya Oblast, reports TASS correspondent V. Shiliyakov. The marshes and floodplains of the rivers have been welded together by ice pincers. The route can now tolerate the largest and heaviest equipment. The length of the route is 102 kilometers. It opens the path to casing-head gas, which had until now been burned off in flares at the fields. Fuel will be produced from it at the plant for the Surgutskaya GRES and the plants of the Kuzbass and also valuable raw material will be produced for petrochemical enterprises. Fifty kilometers have now been welded on the route. Var'yegan gas will arrive at Belozerskiy plant during the first half of the year. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 17 Jan 80 p 1] 6521

HELICOPTER SUPPORT--This is a busy time for the builders of the second link of the Surgut-Polotsk oil pipeline. They are rushing to cover the difficultly accessible sections of the marshes and swamps near the spurs of the Urals Ridge during the winter cold. But the low floodplain shore of the Kama River does not freeze over even during this season. The pipe-carrying trucks cannot deliver pipes to the route. Six MI-6 helicopters of the Urals Civil Aviation Administration arrived to assist the installers of Glavvostoktruboprovodstroy. Within 20 minutes a section of pipe about 15 meters long and weighing up to four tons is delivered to the point of installation. The aerial installers made 15-18 flights each per day. They "dropped" more than 5,000 steel sections on the route. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 8 Feb 80 p 3] 6521

VOZEY-SEVERNYY VOZEY PIPELINE--Usinsk, Komi ASSR, 17 Feb 80--The line of the new Vozey-Severnyy Vozey oil pipeline has been laid across impassable swamps. Mechanized detachments of builders today began theassault along the entire route. The first kilometers of the steel bed have been welded and laid in the trench. The oil pipeline will deliver yet another field ahead of schedule to serve the national economy. [Text] [Moscow PRAVDA in Russian 18 Feb 80 p 1] 6521

MECHANIZATION OF COAL PRODUCTION--The collective of the oldest coal enterprise of Ekibastuz--the Tsentral'nyy strip mine, where a new mechanized complex has been started up, is increasing production of fuel. The productivity of the unit is 1,250 cubic meters per hour. The brigade of Dmitri Zagolovtsev, which installed this rotary excavator and operates on it, yesterday sent the first unit of lignite to the electric power plants of the Urals. Almost 90 percent of this fuel is now mined in the basin by using powerful rotary equipment. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Feb 80 p 1] 6521

COMPUTER-AIDED PIPELINES--Electronics has taken on itself a significant part of the concerns of controlling the major oil pipelines which link Yaroslavl' to Moscow, Gor'kiy and Kirishi. The first unit of the information-computer complex, designed for centralization and dispatcher control of oil pipelines, has begun to operate. A special telemechanical system gathers information from the petroleum refining stations--it records the pressure indicators, condition of the units and auxiliary equipment. Passing through computers, the data provide the dispatcher with the opportunity to have a complete picture of the operation of all stations and major pipelines as a whole. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Feb 80 p 2] 6521

PIPE-WELDING OPERATIONS--A unit developed by specialists of the Vilnius Branch of the All-Union Scientific Research Institute of Electric-Arc Welding Equipment, significantly accelerates welding operations on gas and oil pipelines. The innovation has an electric furnace for drying electrodes. An additional diesel generator not only provides light during nighttime operations, but also supplies the seam-grinding mechanisms, used for the first time, with energy. The installation, output of which is being prepared at the Dagelektromash Plant at Makhachkala, is simple in design and less metal is used to manufacture it. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Feb 80 p 2] 6521

FUEL-STORAGE FACILITIES--Construction of a special platform for a reservoir with capacity of 50,000 cubic meters has begun at Surgut. This capacious tank for liquid fuel storage is being constructed for the first time in Western Siberia. The tank as high as a five-story building will be erected alongside the main oil-pumping station of the long-distance Surgut-Polotsk major pipeline. It is remarkable that the tank will have a floating cover. This will make it possible to have any amount of oil in the tank and to increase the reliability of storing it. Construction of the facility has been entrusted to the Surgut Mechanization Administration No 3, which has pledged to turn the tank over for operation this year [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Feb 80 p 2] 6521

GAS COMPRESSOR STATION--The Bogandinsk Compressor Station of the Urengoy-Chelyabinsk Gas Pipeline has become operational A total of 7,400 kilometers of oil and gas pipelines and more than 20 compressor and pumping stations have been put into operation since the beginning of the five-year plan by construction subdivisions of Tyumenskaya Oblast. A total of 23 new oil and gas fields of the Central Ob' region and the Pre-Arctic region has been connected to the long-range transport system. Hundreds of millions of tons of Siberian oil and more than 162 billion cubic meters of gas remain to be pumped during the final year of the five-year plan. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Apr 80 p 2] 6521

PIPELINE WELDING--The last joint of the Chelyabinsk-Petrovsk pipeline was welded 100 kilometers from Kuybyshev. Gas will be delivered to the chemical giant--the Togliatti Nitrogen Plant, other enterprises and to kolkhozes and sovkhozes through the new underground pipeline. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Apr 80 p 2] 6521

GAS REFINING--The Yuzhno-Balyk Gas-Refining Plant [Tyumenskaya Oblast] has been brought up to design capacity, which made it possible to extinguish several more flares in the oil fields of the Central Ob' region. [Text] [Moscow EKONOMICHESKAYA GAZETA inRussian No 9, Apr 80 p 2] 6521

CHEMICAL PIPELINE CONSTRUCTION--Tests of the pilot section of the Yuzhnyy Balyk-Tobol'sk Product Pipeline have been completed. Unstable casing-head gasoline will be delivered from the gas-refining plants of the Central Ob' region through this pipeline to the Tobol'sk Petrochemical Combine. The pilot section was constructed by the Yugansktruboprovodstroy Trust. The gas refiners of Yuzhnyy Balyk can now increase production of unstable casing-head gasoline without waiting for completion of construction of the entire pipeline. The tested 44-kilometer section of the pipeline will be used as a tank for storage of the valuable chemical raw material. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 7 Mar 80 p 2] 6521

ENERGY CONSERVATION--An effective method of conserving heat losses enroute from the TETs to users has been found by scientists of Donetsk University. They proposed that so-called surfactants be added to the heated water. These additives "suppress" the turbulent flows which occur during motion of the liquid. Not only is heat consumption during transport reduced significantly, but the corrosion resistance of the pipes is increased: the additive forms a protective film on the pipeline walls. "The method of saving heat developed at Donetsk opens new opportunities in development of centralized heat-supply systems," reported corresponding member of the Ukrainian SSR Academy of Sciences I.Povkh. "The increasing needs for clean air quality have made it necessary to remove TETs beyond the city boundaries. And this leads to lengthening the pipelines and increasing the capacity of the pumps and pipe sections. The method which we proposed will permit solution of this problem with considerably fewer expenditures." [Text] [Riga SOVETSKAYA LATVIYA in Russian 5 Jan 80 p 2] 6521

NATURAL GAS PRODUCTION--There is now no single populated point in Moldavia where gas is not used: natural gas from the Orenburg field yesterday arrived at the village of Staraya Kobuzka near the Dnester River. It arrived through the pipeline laid from the USSR-Bulgaria pipeline which intersects the republic. Apartment buildings are being connected primarily to it. The inexpensive fuel will begin to heat kolkhoz greenhouses in the near future and will be used in preparation of feeds on livestock farms. [Text] [Moscow TRUD in Russian 26 Feb 80 p 1] 6521

SHEBELINKA-IZMAIL GAS PIPELINE--An additional 660-kilometer "thread" of the existing Shebelinka-Izmail Gas Pipeline has become operational. It will permit a significant increase in delivery of natural gas to the enterprises of the Ukraine and Moldavia. [Text] [Moscow PRAVDA in Russian 16 Jan 80 p 6] 6521

MAYKOP-SOCHI PIPELINE--The Maykop-Sochi Gas Pipeline has become operational. Constructed by the Kiev VNIPItransgaz of Mingazprom [Ministry of the Gas Industry], the 200-kilometer pipeline was laid by the collective of the Yerevan Experimental SMU [Construction and installation administration] of Minneftegazstroy [Ministry of Construction for Oil and Gas Industry Enterprises]. These were difficult kilometers. A pipeline 700 millimeters in diameter intersects mountain ridges, crosses 143 rivers and gulleys and passes through dangerous slide sections. Ordinary construction equipment was impotent on the steep mountain slopes; therefore, the pipes were delivered by helicopters. And now gas from the Maykop Field is being received by Apsheronsk and Khadyzhensk and the resort settlement of Lazarevskoye. Natural gas will arrive at Sochi during the next few days. The air basin over the resort will become cleaner. And the builders will continue their work. They must still lay gas pipelines to many populated points of the Black Sea coast. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Jan 80 p 2] 6521

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